Introducing Delta Product Group's

SDS+RTD

(Safe D Scale PLUS Ready to Descale)

Documentation Booklet

DELTA
PRODUCTS
GROUP

Rev. 2/2023

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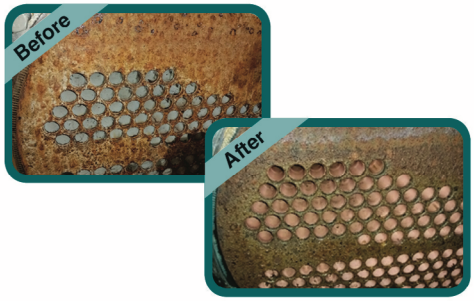
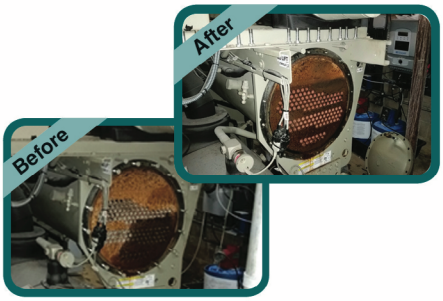
SDS+RTD





DELTA PRODUCTS GROUP

SDS+RTD (Ready to Descale) is our newest unique descaler. It was designed with convenience in mind for the end user who loves using our ***PS8000 Pre-Soak*** along with our other descalers. It too is non-hazardous, biodegradable, non-toxic and safe enough to hold in the open hand. It will dissolve calcium carbonate, rust, lime and other water formed deposits from just about any type of water operated equipment. It is not just limited to use in places such as; food plants, hospitals, manufacturing and steel plants. For those who need to clean and beautify swimming pools and decorative water fountains, this is a great product for these types of applications as well. Be the hero and introduce this amazingly safe product to your boss, friend, co-worker or customer. Not only will you enjoy using it, you will reap the energy savings benefit with a ROI in a very short time.

Additional *SDS+RTD* Benefits

Environmentally Friendly
- Non-hazardous and Biodegradable
- Safe enough to hold in the open hand

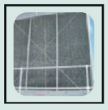
Rapid Cleaning Action
- Average cleaning is 2-4 hours
- Dissolve two pounds per gallon used

Energy Savings
- Watch the equipment temps lower in minutes
- Experience lower energy bills

Safe to Touch
- Don't knock it until you've tried it
- The proof is on the shiny metals

Onsite Labor & Training
- Turn-key labor available
- On site or at Delta training available

Application
- Endless-Got scale?
- Get Delta Descalers!



DELTA PRODUCTS GROUP • P.O. Box 6466 • Aurora, IL 60598-0466
www.deltaproducts.com • 888-DESCALE

DELTA
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Complete Thermal Restoration
with safe, biodegradable

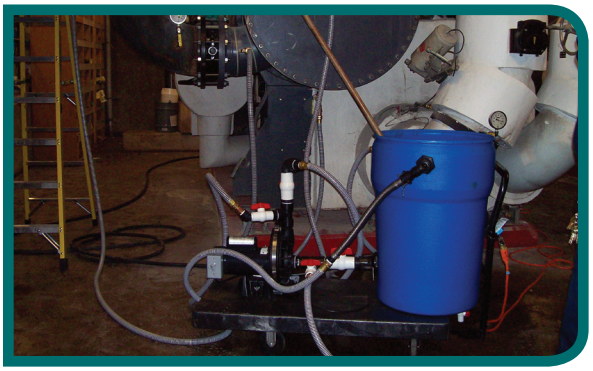
DELTA PRODUCTS

Restoring optimal heat transfer through advanced chemistry and technology

Delta's In-House Consulting...

- System performance evaluations
- Flow and delta t studies
- Heat transfer studies
- Heating/cooling system needs analysis
- Unit and systems mechanical inspections

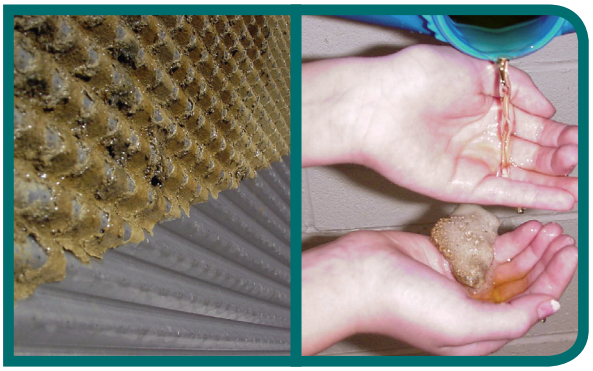
How is your system performing?



Safe Chemicals and Delta Products...

- Biodegradable and safe to handle
- Scale removal products
- Corrosion removal products
- Bio-growth removers
- Dispersants and surfactants
- Petroleum product removers
- pH correction products
- Corrosion protection products
- Research and process development

Which products do your systems need?



Full Service Consulting and Engineering...

Delta Products Group is dedicated to providing our clients with innovative technical solutions that promote ongoing operational excellence. Our value-added approach integrates leading management, engineering and pioneering methodologies in order to accurately evaluate all factors affecting your operations. This total approach enables us to provide your organization with turn-key project solutions that are designed to fit exactly to your unique process requirements. Our staff is dedicated to delivering responsive, complete and accurate process solutions aimed at achieving the client's "best value" between optimum results and capital cost.

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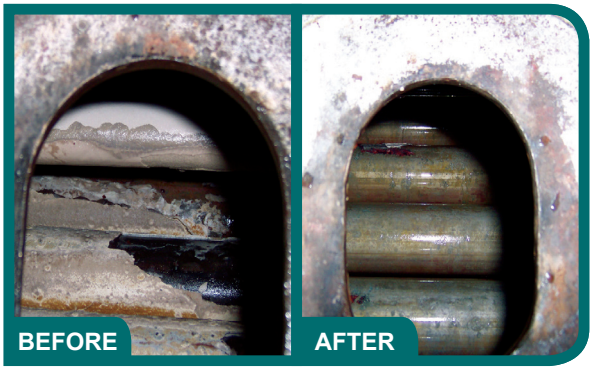


The Delta Products Competitive Advantage...

- Delta is proud of being recognized as an industry leader for its high level of safe and professional operations.
- Delta's laboratory enables our technicians to successfully monitor and manage the optimization process.
- Delta provides our clients with documentation of project objectives, benefits and return of investment.
- Delta offers a "turn-key" solution by providing complete services including: advanced analytical services, complete technical services, detailed reporting and safe cleaning technology to the manufacturing industry.
- Delta's technical staff will work closely with our clients to determine the best solution and cleaning program that will provide beneficial and proven results. Call your local Delta representative for a plant inspection today.

Optimization Through Delta's Data Driven Decision Making...

Delta manages and adjusts its cleaning and optimization process specifically to your system's needs based on your distinct data. We obtain this vital information through laboratory testing and monitoring. This is opposed to using the standard and common blanket approach that is based on notion more than numbers. This can many times outright harm or reduce the life of your system. Rather than saving money, this practice can severely cost your organization in many ways.

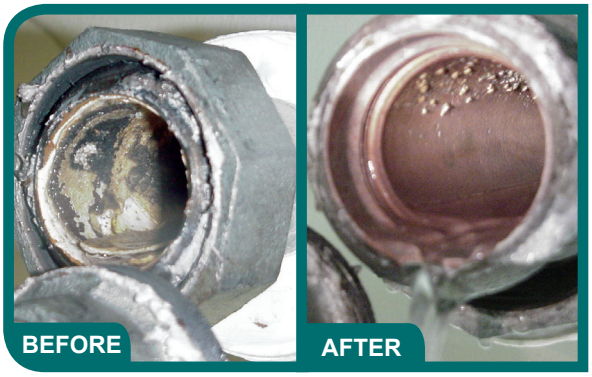
We provide detailed documentation and project efficiency studies that show the specific results of our safer, more efficient process. This includes showing how project objectives have been met and a summary of overall benefits, specifically, your return on investment.

Delta Products prides itself for being recognized as the premiere supplier for US Navy Nuclear descalings and cooling system cleanings.

Boiler Optimization...

- Significantly reduces fuel and utility costs
- Safely removes scale and oxidation
- Restores mechanical integrity
- Lowers stack temperature – lower emissions

What condition is your boiler in?



Condensing Cooling System Optimization...

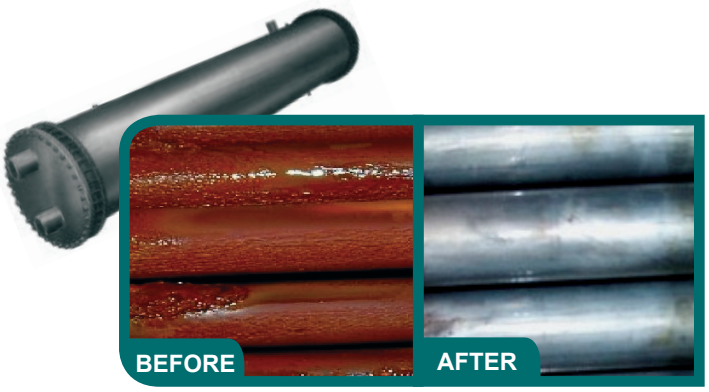
- Increases unit performance
- Safely removes scale and oxidation
- Removes bio-growth
- Eliminates dirt and sludge
- Restores corrosion protection

Works to meet your schedule

Heat Exchanger Optimization...

- Immediate heat transfer improvement
- Greatly improves process efficiency
- Safely removes scale and sludge
- Restore mechanical integrity to all types of heat exchangers
- Services equipment in place

No need to take the equipment apart



Delta's In-Shop Capabilities...

- Safely restores: heat exchangers and cooling tower baffles
- Optimize all types of scaled equipment
- Research and process development
- Develop pilot processes for unique applications
- All restoration services fully documented

No need to let scaled equipment sit idle

Section 2: Safety Data Sheet (SDS)

P.O. Box 6466
Aurora, IL 60598-0466

Phone: 888-337-2253
Fax: 630-264-9741
www.deltaproducts.com

Safety Data Sheet

Product ID: 561 ***SDS+RTD***
Revised: April 5, 2017

Product ID: 561 ***SDS+ RTD***
Revised: April 5, 2017

- **IDENTIFICATION**

Product Name: ***SDS+ RTD (Ready to Descale)***
Recommended Use: Aqueous Descaler for the SAFE removal of water scale, calcium & rust deposits.

Delta Products Group
P.O. Box 6466
Aurora, IL 60598-0466

www.DeltaProducts.com
888-DESCALE
888-337-2253 630-264-6001

2. HAZARDS IDENTIFICATION

There are NO Hazards associated with this MIXTURE. Hazard Classification: Not Hazardous;
Signal Word: None, N/A; Hazard Statements: None, N/A; Precautionary Statements: None, N/A

3. COMPOSITION / INFORMATION ON MIXTURE INGREDIENTS

Component of Preparation	CAS #	% by Wt	PEL	TLV	Other
Aqueous Hydrogen Chloride	7647-01-0	5.5-9.9	5ppm	2ppm	N/A

There are NO additional ingredients present which are classified as hazardous to health or the environment. CBI is not harmonized under GHS. Full disclosure of these formulations is protected under the IL Trade Secret Act and CBI provisions have not compromised our user's safety.

4. FIRST-AID MEASURES

Eye Contact: Flush eyes immediately with water for 15 minutes. If irritation persists, seek medical.
Symptoms include redness, tearing, stinging similar to lemon juice.
Skin Contact: Rinse with water. Wash well with soap and water if itching persists.
Symptoms include mid irritation, itching, stinging sensation on open cuts.
Inhalation: Remove to fresh air. There are no fumes from the product, but likely from deposits.
Symptoms include mild irritation to respiratory tract from over-misting of product.
Ingestion: If swallowed, do not induce vomiting. Rinse mouth immediately of terrible taste.
Symptoms include upset stomach or irritation with nausea. Similar to stomach acids.
Note to Physicians: This is a non-hazardous descaler and can be held openly in your bare hands. It will however dissolve calcium deposits and should not be combined with exposed teeth or cuts.

5. FIRE-FIGHTING MEASURES

Extinguishing Media: Water spray, foam or extinguisher for surrounding materials.
Fire Fighting Methods: This liquid does not burn, but any normal methods may be used in a fire.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions: Contain spills and minimize personal contact with fluids. Wash afterwards.
Environmental Precautions: Material is wholly biodegradable. It should be spent prior to disposal. Dispose of all spent materials in accordance with Federal, State, Provincial or local regulations.
Clean-up Procedures: Rinse with water to sewer drain. Not for disposal down storm sewers.

7. HANDLING AND STORAGE

Handling: Preserve integrity of containers. Store in a cool place. Keep closed and uncontaminated.
Safe Storage: Five (5) year shelf life. Lot number and expiration month/year on container sticker. Store between 15° F and 120° F and keep out of the reach of children. This is an industrial cleaner.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

This product contains no substances with occupational exposure values.

Engineering Controls: None required. General outside ventilation and normal safety practices.
Respiratory Protection: None required under normal use conditions.
Eye/Face Protection: Keep from eyes. Safety glasses/goggles would be a good option to consider.
Body/Skin Protection: May be held in your bare hand without danger. Gloves for sensitive skin. Change contaminated clothing and wash after use & before eating or using the bathroom.
General Safety Measures: This is an industrial strength cleaner and should be handled as such.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Dark liquid
Color: Translucent black, like coffee
Odor: Slight wintergreen
pH Value: Less than 3
Freezing Point: 25 Degrees F
Boiling Point: 215 Degrees F
Flash Point: None, will not support combustion
Solubility in Water: 100%

10. STABILITY AND REACTIVITY

Reactivity: No special reactivity to report, Hazardous Polymerization will NOT occur.
Chemical Stability: Very stable under the recommended storage conditions.
Hazardous Reactions: Avoid strong caustics. Potential violent pH change reactions.
Incompatible Materials: Strong caustics or alkalis, bleach or chlorinated products.

11. TOXICOLOGICAL INFORMATION

See Section 12 below for LC 50 information. FIRST descalers approved by the U.S. Navy for nuclear submarine & aircraft carrier ONBOARD descalings. This unique technology has been available since 1938.
Routes of Exposure: Eyes, Ingestion, Skin and Inhalation
Eye Contact: Will cause irritation. Similar to lemon juice.
Ingestion: No hazard expected under normal use. May be harmful to teeth if swallowed.
Skin Absorption: No data available. Causes slight itching sensation.
Inhalation: No hazard expected under normal use.
None of this product's components are listed as carcinogens by AGCIH, IARC, NTP or OSHA

12. ECOLOGICAL INFORMATION

Fish and Aquatic Invertebrates: Fathead minnow (P. promelas) and water flea (C. dubia)
LC-50: 4049.9 mg/L and 3268.5 mg/L respectively NOEL: 2500 mg/L
Manufacturer's Notes: BOD Values tested to be 16 mg/L which is readily biodegradable. This material will not bioaccumulate but is water soluble and is highly mobile in soils.

13. DISPOSAL CONSIDERATIONS

Waste Disposal of Substance: Expended solutions may be disposed down regular city sewers with a water flush. The dissolved water deposits in a lower pH discharge will not harm the bugs at WWTPs.
Used Packaging: Rinse with water and offer for recycle, if available. Dispose as Non-Hazmat.

14. TRANSPORT INFORMATION

Land and Sea Transport: Common Carrier truck, rail, ocean or air transport shipped same day ARO. International and Air Transport: Export by sea or air freight. HIS# 3402.90.1000 NMFC# 048580
UN info, package, hazard class, group or special precautions all NON-applicable. Non-Pollutant.

15. REGULATORY INFORMATION

TSCA Inventory: All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements. This product meets all the NSF criteria for being rated A3 in all food plants.
SARA Title III Section 311: There are NO Regulated Components or Category Hazards associated with this product.

16. OTHER INFORMATION

NFPA Hazard Codes: Health: 0 Fire: 0 Reactivity: 0 Special: A
Hazard Rating System: Health: 0 Flammability: 0 Reactivity: 0
Most cleaning jobs can be accomplished in 2-4 hours time. Do not circulate this material for more than a four hour period without first consulting the manufacturer or its reps. Use this and all our industrial cleaners as directed and at ambient temps. Elevated temperatures increase risk of harm. This document complies with 29 CFR 1910.1200

SDS Prepared by: Mark Ostermeier
Revised 4/5/17

Section 3: Applications and Procedures

DELTA PRODUCTS GROUP

P.O. Box 6466
Aurora, IL 60598-0466

Phone: 888-337-2253
Fax: 630-264-9741
www.deltaproducts.com

Boiler Instructions

SDS+RTD

Revised: December, 2015

Full boiler cleanings work best, using the standard flow of the boiler for the implementation of the cleaning agent. Utilizing the standard flow process significantly reduces the labor and downtime time for set up. Labor and time to returning the boiler to service is easy with a full boiler cleaning.

The use of the boiler feed system to flush the boiler until 'clear' mitigates the risks of un-dissolved deposits from accumulating in the tubes.

Considerations for the preparation of your boiler

1) Isolate the boiler allowing for a bottom introduction of cleaning agents, to discharge.
2) Allow for a high side discharge to allow and CO_2 production to be vented during circulation.
    a. Pockets of CO_2 will prevent the cleaning agent's ability to contact the deposit, limiting the effectiveness of the cleaning project.

Cleaning process overview

A. Drain boiler
B. Isolate boiler with a low side inlet and high side outlet.
C. Open all drains and hose pipe to an open recirculation vessel.
    a. Provide a local valve at recirculation vessel. (Recirculation vessel is typically the Frack tank, or tote)
D. Set up the circulation pump sized for the application, purging the resulting CO_2 to the recirculation vessel. A minor amount of CO_2 will be created during the cleaning process.
E. Fill the boiler with water (less than 120F) and test the circulation system ensuring a leak free operation.
F. Re-Empty the boiler, or drain to make room for the introduction of cleaning agents
G. Introduce the cleaning agents into the boiler
H. Monitor the cleaning process until cleaning is complete
I. Drain the boiler
J. Remove the pump system from the boiler
K. Using the boiler feed system, flush boiler until 'clear'
L. Remove any boiler piping installed for cleaning and return the boiler to service.

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EVAPORATIVE CONDENSERS

When water scale is deposited on the heat transfer surfaces of an evaporative condenser, the cooling water from the spray heads cannot efficiently condense the refrigerant gas in the coils. As a result, inadequate cooling, over-worked machinery and expensive operation results. The following instructions are for the safe and effective removal of these insulating deposits to return operating efficiencies to the equipment.

1. Turn off main power switch to compressor unit and fans.

2. Shut off water valve, or secure ball float in the off position.

3. Remove over-flow. Drain and flush reservoir of loose deposits. Re-install over-flow.

4. Calculate quantities needed by multiplying tonnage by one half or use one gallon for every two tons of cooling capacity. A 60 ton unit would require about 30 gallons to clean. Each gallon used will dissolve approximately two pounds of deposit.

5. Add ***SDS+RTD*** to reservoir using ***Delta Pumping System*** pump to maintain circulation over top of coils and remove heavy deposits between coils and sides.

6. On heavily fouled units more ***SDS+RTD*** would be needed to completely clean.

7. After the removal of heavy scale deposits from the tubes and after checking to see that ***SDS+RTD*** still has some strength, turn on the circulating pump of the unit. **(NO FANS)** Allow ***SDS+RTD*** to circulate through headers and spray nozzles.

8. Step number seven (7) may be done during the initial circulation of ***SDS+RTD*** if desired. This is a matter of personal preference, deposits and the individual unit.

9. When foaming action stops, the ***SDS+RTD*** will have either lost its strength or the equipment will be free of deposits. Visually determine cleanliness of equipment.

10. When unit is clean and it rains properly in the reservoir, shut off pump, remove over-flow pipe, drain to sewer and thoroughly flush reservoir with water.

11. Re-install over-flow pipe, turn on water valve and circulation pump and re-flush unit.

12. Remove over-flow pipe, shut off water valve, shut off pump and drain unit again.

13. Re-install over-flow pipe, open water valve, adjust ball float, turn on circulation pump, adjust bleed-off valve and turn on main power switch to compressor unit.

14. Unit is now thoroughly cleaned and ready for operation.

15. Periodic ***SDS+RTD*** cleaning will maintain peak operation efficiency of these units and allow maximum rated output by eliminating insulating scale deposits.

(over)

Single Source Solutions

Condensers & Chillers ***SDS+RTD*** *Chart*

Tonnage	Quantity
10	5
25	12
30	15
50	25
75	40
100	50
125	65
150	75
200	100

Heat Exchangers SDS+RTD *Formula*

To calculate the quantity of ***SDS+RTD*** required for cleaning various sizes of heat exchangers, use the following formula. The r denotes radius *in inches* and H denotes length of exchanger *in inches*. This calculates to roughly 50% of the volume in tubes.

$3.14 \times r^2 \times H" \div 1728 \times 7.5 \times .25 =$ gallons required

Both of the above calculations should provide a ballpark figure of descaling product to use for “average” fouling on heat transfer equipment. Heavy scaling will require more.

Section 4: Standard Disposal to Sanitary Sewer

Client:	Delta Products Group P.O. Box 6466 Aurora, IL 60598-0466
Contact:	Mark Ostermeier (630) 357-5544
Laboratory:	American Aquatic Testing, Inc. 890 North Graham St. Allentown, PA 18109
Contact:	Christopher Nally (610) 434 – 9015

CHEMICAL PRODUCT IDENTIFICATION

PRODUCT NAME: **Safe D Scale PLUS pH ADJUSTED**

TESTING SUMMARY:

TEST SPECIES	***P. promelas***	***C.dubia***
COMMON NAME	Fathead minnow	Water flea
TEST DATE	18 December, 2012	18 December, 2012
TEST ENDPOINT	LC_{50}	LC_{50}
TEST RESULT	**4049.9 mg/L**	**3268.5 mg/L**
CONFIDENCE LIMITS	3389.8-4840.8	2816.8-3844.5
NOEL (No-Observed-Effect-Level)	**2500 mg/L**	**2500 mg/L**
TEST PARAMETERS	See Table I	See Table II

REPORT CERTIFICATION

I certify under penalty of law that this report is an accurate and truthful representation of the toxicity testing which was performed by American Aquatic Testing, Inc., located at 890 North Graham St. Allentown, Pennsylvania. I further certify that I have personally examined and am familiar with the information submitted in this document and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is complete as presented. I am aware that there are significant penalties for submitting false information.

Christopher J. Nally
President, Laboratory Director

TABLE I: Summary of Conditions for *Pimephales promelas* Toxicity Test [1]*

1.	Test type;	Static, daily renewal
2.	Temperature;	20.0 +/- 1.0 ° C
3.	Light quality;	Wide-spectrum fluorescent illumination
4.	Light intensity;	50 - 100 foot-candles
5.	Photoperiod;	16 hours light, 08 hours dark
6.	Test chamber size;	1000 mL glass beakers
7.	Test solution volume;	500 mL
8.	Renewal;	Daily
9.	Age of test organisms;	8 days old
10.	Number organisms / replicate;	10
11.	Replicates;	02
12.	Feeding;	0.1 mL of *Artemia* nauplii two hours prior to 48 hour exchange
13.	Cleaning;	Siphon daily before solution renewal
14.	Aeration;	None unless dissolved oxygen concentrations $\leq$ 40 % saturation, then ~ 100 bubbles / min.
15.	Dilution water;	EPA Moderately hard water
16.	Test media concentrations;	0, 625,1250,2500,5000,10000 ppm
17.	Water quality;	Conductivity, dissolved oxygen, pH, temperature
18.	Test duration;	96 hours
19.	Effects measured;	LC_{50} and NOEL
20.	Test acceptability;	Minimum control survival 90 %

* Test conducted according to AAT, Inc. Standard Operating Procedure (SOP) GENCHR001.1, with references to SOP's GENTOX001.1, GENTOX002.1, GENLAB002.0, GENCUL001.0

American Aquatic Testing, Inc. 890 N. Graham St. Allentown, PA

TABLE II: Summary of Conditions for *C. dubia* Toxicity Test [1]*

1.	Test type;	Static, daily renewal
2.	Temperature;	20.0 +/- 1.0 ° C
3.	Light quality;	Wide-spectrum fluorescent illumination
4.	Light intensity;	50 - 100 foot-candles
5.	Photoperiod;	16 hours light, 08 hours dark
6.	Test chamber size;	1000 mL
7.	Test solution volume;	80 mL
8.	Renewal;	Daily
9.	Age of test organisms;	< 1 day
10.	Number organisms / replicate;	10
11.	Replicates;	2
12.	Feeding;	YWT/algae solution prior to test initiation
13.	Cleaning;	None
14.	Aeration;	None unless dissolved oxygen concentrations ≤ 40 % saturation, then ~ 100 bubbles / min.
15.	Dilution water;	EPA Moderately hard water
16.	Test media concentrations;	0, 625,1250,2500,5000,10000 ppm
17.	Water quality;	Conductivity, dissolved oxygen, pH, temperature
18.	Test duration;	48 hours
19.	Effects measured;	LC_{50} and NOEL
20.	Test acceptability;	Minimum control survival 90 %

* Test conducted according to AAT, Inc. Standard Operating Procedure (SOP) GENCHR001.1, with references to SOP's GENTOX001.1, GENTOX002.1, GENLAB002.0, GENCUL002.0

American Aquatic Testing, Inc. 890 N. Graham St. Allentown, PA

REFERENCES

[1] **Weber, Cornelius I.**, et al. 1993 Methods for Measuring the Acute Toxicity of effluents and Receiving Waters to Freshwater and Marine Organisms, 4th Edition, EPA/600/4-90-027F, Environmental Monitoring Systems Laboratory, Office of Research and Development Cincinnati, Ohio 45268

APPENDIX A

RAW DATA – TOXICITY TESTING

Safe D Scale PLUS

Acute Test

American Aquatic Testing, Inc.

Job #: 311-01-01 — Start Date & Time: 12-17-12 1410
Species: P. promelas — End Date & Time: 12/22/12 1700
Hatch Date: 12/10/12 — Dilution Water: EPA Mod. Hard

Concentration ppm	Rep.	Live Count 0 hr.	24 hr.	48 hr.	72 hr.	96 hr.	Appearance & Behavior 0 hr.	24 hr.	48 hr.	72 hr.	96 hr.
Control	A	10	10	10	10	10	1	1	1	1	1
	B	10	10	10	10	10	1	1	1	1	1
625	A	10	10	10	10	10	1	1	1	1	1
	B	10	10	10	10	10	1	1	1	1	1
1250	A	10	10	10	10	10	1	1	1	1	1
	B	10	10	10	10	10	1	1	1	1	1
2500	A	10	10	10	10	10	1	1	1	3	3
	B	10	10	10	8[2]	8	1	1	1	3	3
5000	A	10	10	9[1]	5[4]	0[3]	1	2	3	2	2
	B	10	10	9[1]	7[3]	4[3]	1	2	3	2	2
10000	A	10	2[3]	0[2]	–	–	1	2	–	–	–
	B	10	1[4]	0[1]	–	–	1	2	–	–	–
Initials		TAP	TAP	TAP	TAP	CH	TAP	TAP	TAP	TAP	TAP
Date		12/18	12/19	12/20	12/21	12/22	12/18	12/19	12/20	12/21	12/22

Observation Key: 1–Normal, 2–Inactive, 3–Irritated, 4–Surfacing, 5–Abnormal body orientation, 6–Abnormal skin color, 7–Abnormal skin condition, 8–Abnormal respiration

Weight and Length Data

Length in Millimeters		Weight in Grams	
1	11	1	11
2	12	2	12
3	13	3	13
4	14	4	14
5	15	5	15
6	16	6	16
7	17	7	17
8	18	8	18
9	19	9	19
10	20	10	20
Initials			
Date			

Chamber Volume (L): _____ Average Weight (g): _____ Standard Dev.: _____

Loading Factor (g/L): _____

Length of Shortest Fish (mm): _____ Length of Longest Fish (mm): _____

Mean Length (mm): _____ Standard Deviation: _____

ACFWLCOW

Freshwater Acute Test

American Aquatic Testing, Inc.

Job #: 311-01-01 — Start Date & Time: 12-18-12 1410
Species: P. promelas — End Date & Time: 12/22/12 1700
Dilution Water: EPA Mod. Hard — Test Type: 96hr. SDR

Concentration ppm	Rep.	Dissolved Oxygen (mg/L) 0 hr.	24 hr.	48 hr.	72 hr.	96 hr.	Temperature (C) 0 hr.	24 hr.	48 hr.	72 hr.	96 hr.
Control	A	8.4	8.5	7.9	8.6	8.0	~~20.0~~	~~20.5~~	20.5	20.0	20.0
	B	8.4	8.5	7.9	8.5	8.1	~~20.0~~	~~20.5~~	20.5	20.0	20.0
625	A	8.4	8.5	7.9	8.5	8.1	~~20.0~~	~~20.5~~	20.5	20.0	20.0
	B	8.4	8.5	7.9	8.5	8.0	~~20.0~~	~~20.5~~	20.5	20.0	20.0
1250	A	8.4	8.5	7.9	8.6	8.1	~~20.0~~	~~20.5~~	20.5	20.0	20.0
	B	8.4	8.5	7.9	8.6	8.0	~~20.0~~	~~20.5~~	20.5	20.0	20.0
2500	A	8.4	8.5	7.9	8.5	8.0	~~20.0~~	~~20.5~~	20.5	20.0	20.0
	B	8.4	8.5	8.0	8.5	8.0	~~20.0~~	~~20.5~~	20.5	20.0	20.0
5000	A	8.4	8.5	8.0	8.5	7.8	~~20.0~~	~~20.5~~	20.5	20.0	20.0
	B	8.4	8.5	8.0	8.5	7.7	~~20.0~~	~~20.5~~	20.5	20.0	20.0
10000	A	8.4	8.6	8.1 ④	–	–	~~20.0~~	~~20.5~~	20.0 ④	–	–
	B	8.4	8.6	8.2 ③	–	–	~~20.0~~	~~20.5~~	20.0 ③	–	–
Initials		TAP	TAP	TAP	TAP	CH	TAP	TAP	TAP	TAP	CH
Date		12/18	12/19	12/20	12/21	12/22	12/18	12/19	12/20	12/21	12/22

Concentration ppm	pH (std units) 0 hr.	24 hr.	48 hr.	72 hr.	96 hr.	Conductivity (umhos) 0 hr.	24 hr.	48 hr.	72 hr.	96 hr.
Control	8.0	8.0	8.0	8.0	7.8	~~263~~	~~269~~	263	255	261
625	6.9	6.0	6.0	6.0	6.6	~~363~~	~~360~~	342	353	359
1250	~~6.5~~	6.0	6.2	6.1	6.5	~~552~~	~~529~~	516	521	580
2500	6.5	6.1	6.0	6.0	6.5	~~864~~	~~887~~	875	856	900
5000	6.0	6.0	6.1	6.0	6.0	~~1497~~	~~1478~~	1493	1490	1499
10000	6.0	6.1	6.9 ④	–	–	~~2708~~	~~2700~~	2715 ③	–	–
Initials	TAP	TAP	TAP	TAP	CH	TAP	TAP	TAP	TAP	CH
Date	12/18	12/19	12/20	12/21	12/22	12/18	12/19	12/20	12/21	12/22

Concentration	Alkalinity (mg/L) 0 hr.	24 hr.	48 hr.	72 hr.	96 hr.	Hardness (mg/L) 0 hr.	24 hr.	48 hr.	72 hr.	96 hr.
Control										
100%										
Initials										
Date										

Concentration	Chlorine (mg/L) Sample 1	Sample 2	Sample 3	Sample 4
Control				
100%				
Initials				
Date				

Observations: ①6.4 - TAP 12/18

③Reading done prior to exchange due to total mortality - TAP 12/20

ACFWPAR.WK3

Project Number: 311-01-01 — Beginning Date & Time: 12-18-12 1410
Species: P. promelas & C. dubia — Ending Date & Time: 12/22/12 1700

Salinity and pH Adjustments

American Aquatic Testing, Inc.

Sample Number	Initial Salinity	Final Salinity	Initial pH	Final pH	Adjusted pH	mls of acid (base) add.	Initials	Date
625 ppm	—	–	3.1	–	6.0	0.70	TAP	12/18
1250 ppm	—	–	2.6	–	6.4	2.5	TAP	12/18
2500 ppm	—	–	2.3	–	6.5	5.75	TAP	12/18
5000 ppm	—	–	2.1	–	6.0	12.2	TAP	12/18
10000 ppm	—	–	1.7	–	6.0	25.5	TAP	12/18
625 ppm	–	–	3.5	–	6.0	0.65	TAP	12/19
1250 ppm	–	–	2.8	–	6.0	2.3	TAP	12/19
2500 ppm	–	–	2.4	–	6.1	5.25	TAP	12/19
5000 ppm	–	–	2.0	–	6.0	12.1	TAP	12/19
10000 ppm	–	–	1.7	–	6.1	25.25	TAP	12/19
625 ppm	–	–	3.4	–	6.0	0.60	TAP	12/20
1250 ppm	–	–	~~3.0~~ ②	–	6.2	2.5	TAP	12/20
2500 ppm	–	–	2.3	–	6.0	5.75	TAP	12/20
5000 ppm	–	–	2.0	–	6.1	12.25	TAP	12/20
625 ppm	–	–	3.2	–	6.0	0.70	TAP	12/21
1250 ppm	–	–	2.7	–	6.1	2.40	TAP	12/21

Observations: ①1N Sodium Hydroxide ②2.7 - TAP 12/20

Project Number: 311-01-01 Beginning Date & Time: 12-18-12 1410
Species: P.promelas Ending Date & Time: 12/22/12 1700

Salinity and pH Adjustments
American Aquatic Testing, Inc.

Sample Number	Initial Salinity	Final Salinity	Initial pH	Final pH	Adjusted pH	mls of acid (base) add.	Initials	Date
3500 ppm	—	—	7.3	—	6.0	5.80	TAP	12/21
5000 ppm	—	—	2.1	—	6.0	12.75	TAP	12/21

Observations :

Acute Fish Test-24 Hr Survival

Start Date: 12/18/2012 Test ID: 3110101Pp Sample ID: Delta
End Date: 12/22/2012 Lab ID: AAT, INC Sample Type: PREPARED
Sample Date: Protocol: EPAA 91-EPA/600/4-90/027F Test Species: PP-Pimephales promelas
Comments:

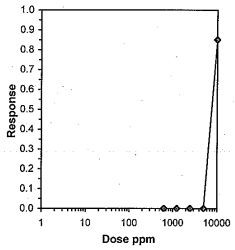
Conc-ppm	1	2
Control	1.0000	1.0000
625	1.0000	1.0000
1250	1.0000	1.0000
2500	1.0000	1.0000
5000	1.0000	1.0000
10000	0.2000	0.1000

Conc-ppm	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Number Resp	Total Number
Control	1.0000	1.0000	0	20	20	2			0	20
625	1.0000	1.0000	0	20	20	2	1.0000	0.0500	0	20
1250	1.0000	1.0000	0	20	20	2	1.0000	0.0500	0	20
2500	1.0000	1.0000	0	20	20	2	1.0000	0.0500	0	20
5000	1.0000	1.0000	0	20	20	2	1.0000	0.0500	0	20
*10000	0.1500	0.1500	17	3	20	2	0.0000	0.0500	17	20

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	5000	10000	7071.07	
Treatments vs Control				

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%			
20.0%	7517.03	6962.73	8115.46
Auto-15.0%	7517.03	6962.73	8115.46



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Acute Fish Test-48 Hr Survival

Start Date: 12/18/2012 Test ID: 3110101Pp Sample ID: Delta
End Date: 12/22/2012 Lab ID: AAT, INC Sample Type: PREPARED
Sample Date: Protocol: EPAA 91-EPA/600/4-90/027F Test Species: PP-Pimephales promelas
Comments:

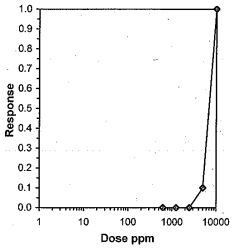
Conc-ppm	1	2
Control	1.0000	1.0000
625	1.0000	1.0000
1250	1.0000	1.0000
2500	1.0000	1.0000
5000	0.9000	0.9000
10000	0.0000	0.0000

Conc-ppm	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Number Resp	Total Number
Control	1.0000	1.0000	0	20	20	2			0	20
625	1.0000	1.0000	0	20	20	2	1.0000	0.0500	0	20
1250	1.0000	1.0000	0	20	20	2	1.0000	0.0500	0	20
2500	1.0000	1.0000	0	20	20	2	1.0000	0.0500	0	20
5000	0.9000	0.9000	2	18	20	2	0.2436	0.0500	2	20
10000	0.0000	0.0000	20	0	20	2			20	20

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	5000	10000	7071.07	
Treatments vs Control				

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	6597.54	6011.66	7240.51
5.0%	6745.97	6006.61	7576.34
10.0%	6803.95	6424.37	7205.96
20.0%	6803.95	6424.37	7205.96
Auto-0.0%	6597.54	6011.66	7240.51



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Acute Fish Test-72 Hr Survival

Start Date: 12/18/2012 Test ID: 3110101Pp Sample ID: Delta
End Date: 12/22/2012 Lab ID: AAT, INC Sample Type: PREPARED
Sample Date: Protocol: EPAA 91-EPA/600/4-90/027F Test Species: PP-Pimephales promelas
Comments:

Conc-ppm	1	2
Control	1.0000	1.0000
625	1.0000	1.0000
1250	1.0000	1.0000
2500	1.0000	0.8000
5000	0.5000	0.7000
10000	0.0000	0.0000

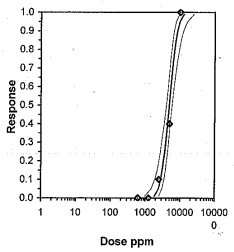
Conc-ppm	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Number Resp	Total Number
Control	1.0000	1.0000	0	20	20	2			0	20
625	1.0000	1.0000	0	20	20	2	1.0000	0.0500	0	20
1250	1.0000	1.0000	0	20	20	2	1.0000	0.0500	0	20
2500	0.9000	0.9000	2	18	20	2	0.2436	0.0500	2	20
*5000	0.6000	0.6000	8	12	20	2	0.0016	0.0500	8	20
10000	0.0000	0.0000	20	0	20	2			20	20

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	2500	5000	3535.53	
Treatments vs Control				

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	5.52367	1.09153	3.38427	7.66307	0	2.92774	7.81472	0.4	3.68941	0.18104	5
Intercept	-15.379	4.02979	-23.277	-7.4807							
TSCR											

Point	Probits	ppm	95% Fiducial Limits	
EC01	2.674	1854.61	969.589	2524.93
EC05	3.355	2463.94	1519.53	3143.62
EC10	3.718	2866.83	1921.67	3549.94
EC15	3.964	3175.25	2244.21	3865.91
EC20	4.158	3443.87	2531.77	4148.37
EC25	4.326	3692.36	2800.34	4418.61
EC40	4.747	4400.96	3555.26	5260.46
EC50	5.000	4891.17	4046.84	5925.17
EC60	5.253	5435.99	4551.63	6754.16
EC75	5.674	6479.21	5408.85	8590.76
EC80	5.842	6946.71	5758.32	9508.82
EC85	6.036	7534.39	6176.28	10729.8
EC90	6.282	8344.95	6723.29	12535.8
EC95	6.645	9709.47	7589.33	15859.5
EC99	7.326	12899.5	9445.37	24864.4



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Acute Fish Test-96 Hr Survival

Start Date:	12/18/2012	Test ID:	3110101Pp	Sample ID:	Delta
End Date:	12/22/2012	Lab ID:	AAT, INC	Sample Type:	PREPARED
Sample Date:		Protocol:	EPAA 91-EPA/600/4-90/027F	Test Species:	PP-Pimephales promelas

Comments:

Conc-ppm	1	2
Control	1.0000	1.0000
625	1.0000	1.0000
1250	1.0000	1.0000
2500	1.0000	0.8000
5000	0.2000	0.4000
10000	0.0000	0.0000

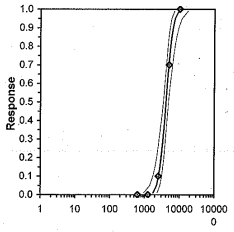
Conc-ppm	Mean	N-Mean	Not Resp	Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Number Resp	Total Number
Control	1.0000	1.0000	0	20	20	2			0	20
625	1.0000	1.0000	0	20	20	2	1.0000	0.0500	0	20
1250	1.0000	1.0000	0	20	20	2	1.0000	0.0500	0	20
2500	0.9000	0.9000	2	18	20	2	0.2436	0.0500	2	20
*5000	0.3000	0.3000	14	6	20	2	0.0000	0.0500	14	20
10000	0.0000	0.0000	20	0	20	2			20	20

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	2500	5000	3535.53	
Treatments vs Control				

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	6.41177	1.33758	3.79012	9.03342	0	0.20124	7.81472	0.98	3.60744	0.15596	3
Intercept	-18.13	4.83008	-27.597	-8.6632							
TSCR											

Point	Probits	ppm	95% Fiducial Limits	
EC01	2.674	1756.38	950.395	2322.03
EC05	3.355	2243.4	1418.75	2799.72
EC10	3.718	2556.04	1748.95	3106.81
EC15	3.964	2791.24	2008.13	3342.78
EC20	4.158	2993.51	2235.62	3551.97
EC25	4.326	3178.69	2445.37	3750.77
EC40	4.747	3697.69	3022.69	4363.22
EC50	5.000	4049.89	3389.79	4840.81
EC60	5.253	4435.64	3759.77	5430.23
EC75	5.674	5159.87	4372.13	6714.65
EC80	5.842	5479.05	4616.38	7345.35
EC85	6.036	5876.09	4904.84	8178.16
EC90	6.282	6416.79	5276.95	9390.84
EC95	6.645	7311.05	5855.32	11577.4
EC99	7.326	9338.29	7059.36	17284



Freshwater Acute Test

American Aquatic Testing, Inc.

Job #: 311-01-01 Start Date: 12-18-12 Time: 1515

Species: C. dubia End Date: 12-20-12 Start Time: 1515

Dilution Water: EPA Mod. Hard Test Type: 48hr. SDR

Concentration ppm	Rep.	Dissolved Oxygen (mg/L) 0 hr.	24 hr.	48 hr.	Temperature (C) 0 hr.	24 hr.	48 hr.	Live Count 0 hr.	24 hr.	48 hr.
Control	A	8.4	8.5	8.2	20.0	20.5	20.0	10	10	10
	B	8.4	8.5	8.1	20.0	20.5	20.0	10	10	10
625	A	8.4	8.5	8.1	20.0	20.5	20.0	10	10	10
	B	8.4	8.5	8.1	20.0	20.5	20.0	10	10	10
1250	A	8.4	8.5	8.2	20.0	20.5	20.0	10	10	10
	B	8.4	8.5	8.2	20.0	20.5	20.0	10	10	10
2500	A	8.4	8.5	8.2	20.0	20.5	20.0	10	9	9
	B	8.4	8.5	8.3	20.0	20.5	20.0	10	10	8 (2)
5000	A	8.4	8.5	8.2	20.0	20.5	20.0	10	3	1 (2)
	B	8.4	8.5	8.2	20.0	20.5	20.0	10	3	0 (3)
10000	A	8.4	8.9 (1)	-	20.0	20.5 (1)	-	10	0	-
	B	8.4	9.0 (1)	-	20.0	20.5 (1)	-	10	0	-
Initials		TAP	TAP	TAP	TAP	TAP	TAP	MP	TAP	TAP
Date		12/18	12/19	12/20	12/18	12/19	12/20	12/18	12/19	12/20

Concentration	Alkalinity (mg/L) 0 hr.	24 hr.	48 hr.	Hardness (mg/L) 0 hr.	24 hr.	48 hr.	Chlorine (mg/L) Sample 1
Control							
100%							
Initials							
Date							

Concentration ppm	pH (std units) 0 hr.	24 hr.	48 hr.	Conductivity (umhos) 0 hr.	24 hr.	48 hr.
Control	8.0	8.0	7.6	263	269	285
625	6.0	6.0	7.3	363	380	374
1250	6.4	6.0	7.4	552	529	550
2500	6.5	6.1	7.3	864	887	930
5000	6.0	6.0	7.2	1497	1483	1545
10000	6.0	6.7 (1)	—	2708	2841 (2)	—
Initials	TAP	TAP	TAP	TAP	TAP	TAP
Date	12/18	12/19	12/20	12/18	12/19	12/20

Observations: (1) Reading done prior to exchange due to total mortality - TAP 12/18
(2) 7-811-TAP 12/19

ACF48PAR.WK3

Acute Fish Test-24 Hr Survival

Start Date:	12/18/2012	Test ID:	3110101Cd	Sample ID:	Delta
End Date:	12/22/2012	Lab ID:	AAT, INC	Sample Type:	PREPARED
Sample Date:		Protocol:	EPAA 91-EPA/600/4-90/027F	Test Species:	CD-Ceriodaphnia dubia

Comments:

Conc-ppm	1	2
Control	1.0000	1.0000
625	1.0000	1.0000
1250	1.0000	1.0000
2500	0.9000	1.0000
5000	0.3000	0.3000
10000	0.0000	0.0000

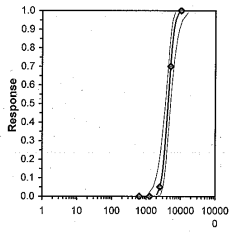
Conc-ppm	Mean	N-Mean	Not Resp	Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Number Resp	Total Number
Control	1.0000	1.0000	0	20	20	2			0	20
625	1.0000	1.0000	0	20	20	2	1.0000	0.0500	0	20
1250	1.0000	1.0000	0	20	20	2	1.0000	0.0500	0	20
2500	0.9500	0.9500	1	19	20	2	0.5000	0.0500	1	20
*5000	0.3000	0.3000	14	6	20	2	0.0000	0.0500	14	20
10000	0.0000	0.0000	20	0	20	2			20	20

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	2500	5000	3535.53	
Treatments vs Control				

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	7.43072	1.67529	4.14716	10.7143	0	0.07012	7.81472	1	3.62453	0.13458	3
Intercept	-21.933	6.08404	-33.858	-10.008							
TSCR											

Point	Probits	ppm	95% Fiducial Limits	
EC01	2.674	2048.59	1110.73	2650.9
EC05	3.355	2530.27	1602.04	3106.42
EC10	3.718	2831.78	1939.86	3393.7
EC15	3.964	3055.25	2201.23	3612.12
EC20	4.158	3245.37	2428.3	3804.36
EC25	4.326	3417.87	2635.94	3986.1
EC40	4.747	3894.32	3199.37	4542.3
EC50	5.000	4212.37	3550.91	4974.33
EC60	5.253	4556.39	3898.59	5506.84
EC75	5.674	5191.54	4457.02	6662.26
EC80	5.842	5467.5	4674.02	7225.62
EC85	6.036	5807.72	4926.61	7964.79
EC90	6.282	6266.03	5247.37	9031.58
EC95	6.645	7012.69	5736.52	10928.7
EC99	7.326	8661.59	6726.65	15752.6



Acute Fish Test-48 Hr Survival

Start Date:	12/18/2012	Test ID:	3110101Cd	Sample ID:	Delta
End Date:	12/22/2012	Lab ID:	AAT, INC	Sample Type:	PREPARED
Sample Date:		Protocol:	EPAA 91-EPA/600/4-90/027F	Test Species:	CD-Ceriodaphnia dubia

Comments:

Conc-ppm	1	2
Control	1.0000	1.0000
625	1.0000	1.0000
1250	1.0000	1.0000
2500	0.9000	0.8000
5000	0.1000	0.0000
10000	0.0000	0.0000

Conc-ppm	Mean	N-Mean	Not Resp	Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Number Resp	Total Number
Control	1.0000	1.0000	0	20	20	2			0	20
625	1.0000	1.0000	0	20	20	2	1.0000	0.0500	0	20
1250	1.0000	1.0000	0	20	20	2	1.0000	0.0500	0	20
2500	0.8500	0.8500	3	17	20	2	0.1154	0.0500	3	20
*5000	0.0500	0.0500	19	1	20	2	0.0000	0.0500	19	20
10000	0.0000	0.0000	20	0	20	2			20	20

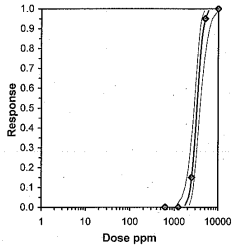
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	2500	5000	3535.53	
Treatments vs Control				

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	8.92015	1.91995	5.15706	12.6832	0	0.00216	7.81472	1	3.51434	0.11211	3
Intercept	-26.348	6.72682	-39.533	-13.164							
TSCR											

Point	Probits	ppm	95% Fiducial Limits	
EC01	2.674	1792.86	1139	2205.78
EC05	3.355	2137.7	1522.57	2531.57
EC10	3.718	2347.87	1769.51	2736.57
EC15	3.964	2501.23	1952.67	2892.58
EC20	4.158	2630.23	2106.75	3029.97
EC25	4.326	2746.18	2243.88	3159.64
EC40	4.747	3061.56	2601.07	3551.02
EC50	5.000	3268.46	2816.83	3844.54
EC60	5.253	3489.36	3028.96	4191.93
EC75	5.674	3890.07	3372.66	4904.59
EC80	5.842	4061.57	3507.39	5238.13
EC85	6.036	4271.04	3664.57	5665.96
EC90	6.282	4550.02	3864.03	6267.76
EC95	6.645	4997.37	4166.62	7302.33
EC99	7.326	5958.55	4769.89	9786.25

Significant heterogeneity detected ($p < 0.01$)



APPENDIX – B

CHAIN-OF-CUSTODY

DOCUMENTATION

AMERICAN AQUATIC TESTING, INC.

890 North Graham St. Job #: 311-01-01
ALLENTOWN, PA 18109
610 434 9015

CHAIN OF CUSTODY

Client: THERMAL SOLUTIONS Client Contact:
Address: DELTA PRODUCTS
Phone #: DAVE BRADLEY

Sample Disposal: **Return to client** [ ] **Lab disposal** [X]

	Initial Chemistry Upon Arrival @ Laboratory						SAMPLE INFORMATION					Toxicity Testing Requested			
Sample #	Temp °C	Dis. O_2	pH	Alk. mg/L	Hard. mg/L	Cl- mg/L	Sample Identification	Sample Type C = Comp G=Grab	Sample Volume	Sample Date	Sample Time	Acute	Chronic	Sediment	Other
01							SAFEDSCALE PUB	PREPARED	500mL	11/29/12	1000	X			

Samples were:
1. Collected by AAT personnel [ ] Client personnel [X]
2. Transported on ice? Yes [ ] No [X]
3. Received with in holding time? Yes [X] No [ ]
4. Sample matrix is: Liquid [X] Sediment [ ] Soil [ ] Other [ ]

CUSTODY INFORMATION

Sample #	Relinquished by:	Received by:	Date	Time	Relinquished by:	Received for Lab:	Date	Time	Lab Use ISTN#
01	D. BRADLEY						11/29/12	1000	121435

Special Instructions: Dilution water collection date(s) N/A

Will ammonia be analyzed on these samples? Yes No
Will additional parameters be analyzed on these samples? Yes No

Section 5: Material Compatibility

DELTA PRODUCTS GROUP

P.O. Box 6466
Aurora, IL 60598-0466

Phone: 888-337-2253
Fax: 630-264-9741
www.deltaproducts.com

SDS+RTD Spec Sheet

1. ***SDS+RTD*** is a non-toxic, non-corrosive, non-flammable, non-injurious tar oil base solvent, heavily fortified with wetting and penetrating agents used for the rapid removal of water scale, lime and rust deposits found on the water side of any equipment that is water cooled, water heated or water operated, in any manner.

   ***SDS+RTD* is biodegradable which allows for expended solution to be disposed of through regular sewer systems with a water flush.**

2. The solution is non-toxic, non corrosive, non-flammable and non-injurious to personnel when used as directed at any temperature within operating limits. (Not to exceed 120°F)

3. The solution does not corrode, erode, attack, pit, oxidize or have other deleterious affects on metals or materials such as:

   COPPER FIBER PLASTIC IRON STEEL RUBBER LEAD

   or other materials or metals found in water heated, water cooled or water operated equipment when used as directed.

4. The exceptions to paragraph 3 are **some** alloys of aluminum, magnesium and stainless steel. These metals will oxidize and, with a few exceptions, discolor. Some alloys of these metals are known to discolor and react galvanically in concentrated ***SDS+RTD*** solutions. To minimize this reaction, use a diluted ***SDS+RTD*** solution. Test compatibility on a small sample area.

5. It is recommended that ***SDS+RTD*** be diluted 50% or more when cleaning chrome as most chrome finishes will discolor.

6. ***SDS+RTD*** is an electrolyte, as are most cleaning agents. An electrolyte is any liquid that will transfer small electrical currents. Examples: Salt Water, Vinegar and Coca Cola.

   An electrolyte may cause plating in some types of equipment. This means a transfer of small amounts of metal onto another metal. In some instances a thin coating of copper may be plated onto a steel drum while circulating an electrolyte such as ***SDS+RTD***.

   The only time plating occurs is when two different metals are in an electrolytic solution.

7. The solution has the ability to dissolve approximately two pounds of calcium carbonate scale per U.S. gallon while at 70°F and in concentrated form.

8. The solution is non-toxic, non corrosive, non-flammable and non-injurious to personnel when used as directed to clean hot water systems, potable water systems, and sprinkler systems. Ensure the system is completely rinsed, testing for remaining chemistry prior to returning the system to service.

S i n g l e S o u r c e S o l u t i o n s

9. The solution does not exude any obnoxious or unpleasant odor in its packaged form.

10. The solution does not require any neutralizers as it is free rinsing with water.

11. The solution has the ability to dissolve deposits from some equipment while in operation and without shutdown, if auxiliary coolers are incorporated.

12. Do not circulate concentrated material for more than a four-hour period without consulting the manufacturer. Most ***SDS+RTD*** cleaning can be accomplished in an average of two hours. Please use material only as directed. Flush all dissolved solids from system when cleaned.

13. The solution has the properties to be mailed or shipped by any private or commercial carrier without restrictions. ***SDS+RTD*** can be shipped same day by air carrier for emergencies.

14. The concentrated solution can be held safely, in the open hand, without deleterious effects.

15. The solution does NOT have an Open or Closed Cup Flash Point and extinguishes flame.

16. The solution has the ability and effectiveness to be used at room temperature (50°F-75°F) with full results obtainable. Elevation of temperatures causes harmful, aggressive properties.

17. The solution does not develop a substantial increase in temperature while dissolving water scale, lime and rust deposits.

18. The solution does not freeze, slush or thicken at any temperature above 10°F.

19. The solution does not deteriorate, oxidize, saponify, or lose effectiveness for five years.

20. The solution is packaged and shipped in single gallon, 5 gallon jugs, 6 gallon cases, 30, 55 and 275 gallon non-returnable containers.

21. The foregoing specifications are applicable to our descaling product, ***SDS+RTD,*** when used according to instructions available upon request and in NO WAY are intended to cover other uses or applications by the purchaser.

element

Element Materials Technology
2 Pheasant Run
Newtown, PA
18940-1819 USA

P 215 579 7500
F 215 579 7591
T 888 786 7555
info.newtown@element.com
element.com

Contact: David Bradley
Thermal Solutions, Inc.
2525 Interchange Road
LEHIGHTON, PA 18235

TEST CERTIFICATE — EAR-CONTROLLED DATA

Date: 3/10/2022
P.O. No.: Dave03042022
W/O No.: THE221-03-07-04060-1

ORDER # 215309
LINE # 1
P/N CO1311450306000
DESCRIPTION 304L
HEAT # BB622

4-Hour Immersion Corrosion Test

Corrosion Coupons: 304L, Heat BB622, ID # B4355 through B4357 and 4365 through 4367
Corrosion Solutions: Customer provided mineral deposit mixed with SDS + RTD aqueous descaler solution at a ratio of 50 grams mineral deposit to 500 mL solution.
Testing Method: ASTM G1-03 (2017) / Customer Requirement
Qty Tested: 6 (2 in vapor, 2 immersion, 2 with 50% immersion)
Testing Conditions: 2 sets of corrosion coupons were hung in a 1L Erlenmeyer flask. Mineral deposit was poured into the Erlenmeyer flask that that was then filled with 0.75L SDS + RTD aqueous descaler solution and attached to an Allihn condenser connected with flowing tap water.

The coupons were suspended with nylon monofilament arranged such that one coupon was hanging in vapor, one was immersed in the solution, and another was suspended with 50% surface immersed in the solution and 50% exposed in the vapor, for 4 hours. A strong effervescent reaction between test solution and mineral deposit caused a small amount of liquid loss from foam out through the Allihn condenser vent. When test was complete, approximately 40% of the two semi-submerged samples remained submerged.

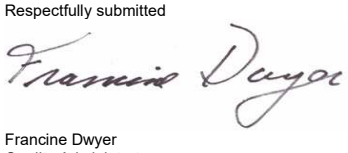
Coupons were cleaned in alcohol before testing, and rinsed in water and dried after testing. Coupon dimensions before testing were measured with areas calculated. Coupons were weighed before and after the immersion corrosion test.

Observation: After the immersion corrosion test for 4 hours, no significant discoloration was observed. No localized corrosion (pitting etc.) observed.

Sample ID #	Width, mm	Length, mm	Thickness, mm	Hole Diameter, mm	*Area, mm^2	Area, cm^2	Weight before, g	Weight after, g	Weight Loss, g	*Corrosion Rate (mils per year, mpy)
B4355	19.20	19.20	19.20	9.70	2649.13	26.49	20.6800	20.6799	0.0001	0.0683
B4356	19.22	19.22	19.22	9.70	2654.35	26.54	20.7821	20.7818	0.0003	0.2046
B4357	19.24	19.24	19.24	9.70	2659.58	26.60	20.8319	20.8314	0.0005	0.3404
B4365	19.24	19.24	19.24	9.70	2659.58	26.60	20.8975	20.8974	0.0001	0.0681
B4366	19.25	19.25	19.25	9.70	2662.19	26.62	20.9113	20.9110	0.0003	0.2040
B4367	19.19	19.19	19.19	9.70	2646.53	26.47	20.8303	20.8299	0.0004	0.2736

Note: B4355 and B4365 were hanging in vapor
B4356 and B4366 started test with 50% surface submerged in solution and 50% exposed in vapor.
B4357 and B4367 immersed in the solution

Respectfully submitted



Francine Dwyer
Quality Administrator

ALL TESTING PERFORMED IN A MERCURY-FREE ENVIRONMENT

element

Element Materials Technology
2 Pheasant Run
Newtown, PA
18940-1819 USA

P 215 579 7500
F 215 579 7591
T 888 786 7555
info.newtown@element.com
element.com

Contact: David Bradley
Thermal Solutions, Inc.
2525 Interchange Road
LEHIGHTON, PA 18235

TEST CERTIFICATE — EAR-CONTROLLED DATA

Date: 3/10/2022
P.O. No.: Dave03042022
W/O No.: THE221-03-07-04060-2

ORDER # 215309
LINE # 2
P/N CO1311590306000
DESCRIPTION 316L
HEAT # BC526

4-Hour Immersion Corrosion Test

Corrosion Coupons: 316L, Heat BC526, ID # B4208 through B4210 and 4198 through 4200
Corrosion Solutions: Customer provided mineral deposit mixed with SDS + RTD aqueous descaler solution at a ratio of 50 grams mineral deposit to 500 mL solution.
Testing Method: ASTM G1-03 (2017) / Customer Requirement
Qty Tested: 6 (2 in vapor, 2 immersion, 2 with 50% immersion)
Testing Conditions: 2 sets of corrosion coupons were hung in a 1L Erlenmeyer flask. Mineral deposit was poured into the Erlenmeyer flask that that was then filled with 0.75L SDS + RTD aqueous descaler solution and attached to an Allihn condenser connected with flowing tap water.

The coupons were suspended with nylon monofilament arranged such that one coupon was hanging in vapor, one was immersed in the solution, and another was suspended with 50% surface immersed in the solution and 50% exposed in the vapor, for 4 hours. A strong effervescent reaction between test solution and mineral deposit caused a small amount of liquid loss from foam out through the Allihn condenser vent. When test was complete, approximately 40% of the two semi-submerged samples remained submerged.

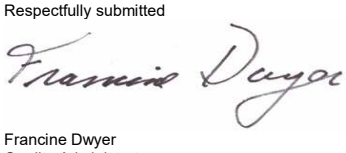
Coupons were cleaned in alcohol before testing, and rinsed in water and dried after testing. Coupon dimensions before testing were measured with areas calculated. Coupons were weighed before and after the immersion corrosion test.

Observation: After the immersion corrosion test for 4 hours, no significant discoloration was observed. No localized corrosion (pitting etc.) observed.

Sample ID #	Width, mm	Length, mm	Thickness, mm	Hole Diameter, mm	*Area, mm^2	Area, cm^2	Weight before, g	Weight after, g	Weight Loss, g	*Corrosion Rate (mils per year, mpy)
B4208	19.22	50.84	2.90	9.72	2300.79	23.01	20.8692	20.8690	0.0002	0.1574
B4209	19.19	50.89	2.92	9.70	2303.61	23.04	20.8260	20.8255	0.0005	0.3930
B4210	19.14	50.79	2.90	9.71	2290.20	22.90	20.8053	20.8045	0.0008	0.6324
B4200	19.18	50.78	2.90	9.71	2294.05	22.94	20.6966	20.6964	0.0002	0.1578
B4199	19.18	50.83	2.90	9.71	2296.26	22.96	20.6197	20.6193	0.0004	0.3154
B4198	19.19	50.77	2.89	9.72	2292.76	22.93	20.4636	20.4629	0.0007	0.5527

Note: B4208 and B4200 were hanging in vapor
B4209 and B4199 started test with 50% surface submerged in solution and 50% exposed in vapor.
B4210 and B4198 immersed in the solution

Respectfully submitted



Francine Dwyer
Quality Administrator

ALL TESTING PERFORMED IN A MERCURY-FREE ENVIRONMENT

ANDERSON LABORATORIES, INC.
Specialists in Materials Evaluation

Mr. Mark Ostermeier
Delta Products Group D245
1655 Eastwood Drive
Aurora, IL 60506

March 15, 2013

Sample Identification: ASTM G31 Immersion Testing of Copper Alloys

Purchase Order#: Credit Card **Project Number**: P13-0402

Objective: We were requested to expose four (4) copper alloys to a solution of SDS+RTD at 30°C ± 2°C for a period of 72 hours in accordance with (IAW) ASTM G31. The solution was reported to have been in its most concentrated form for its application. The copper alloys are as follows:

Metal	UNS Number
90-10 Copper-Nickel	C70600
70-30 Copper-Nickel	C71500
*90-10 CuNi welded with 70-30 CuNi	C70600/71500
Bronze	C92200

Results: All alloys exposed to SRS+RTD for 72 hours at 30°C ± 2°C had corrosion rates less than the maximum permissible limits stated in MIL-STD-3026 , Section 5.2.2.

Alloy	Corrosion rate(mils/year)	Maximum Permissible Corrosion Rate
CDA706	5.4	8
CDA706/CDA715	4.9	8
CDA715	6.5	14
CDA922	6.9	7

Procedures and Data: Each test coupon was cleaned with acetone and thoroughly dried to ensure the sample was clean and contaminant free. Each coupon was then weighed to the nearest 0.0001g on an analytical balance. Glass rods were place at the bottom of the vessels to ensure that the sample coupons did not rest directly on the vessel bottom. The SRS+RTD solution was brought up to the requested 30°C ± 2°C. The sample coupons were not put into the solution until the desired temperature had been reached. Once 30°C had been achieved, the samples were submerged and placed in a manner that prevented them from contact with other coupons. Per the requirements of ASTM G31, the system was then closed using glass condensers. Upon the completion of the exposure period, the coupons were removed, rinsed with de-ionized water, acetone rinsed, dried with filtered, compressed air and placed in a desiccator for a period of 2 hours. The coupons were then re-weighed to determine a mass loss value to be used in the calculation of the corrosion rate.

Established 1939
6330 Industrial Loop, Greendale, WI 53129-2434
(414) 421-7600 (800) 950-6330 FAX (414) 421-6540
www.andersonlabs.com

Procedures and Data (continued):

Volume of Test Solution	Approximately 1200mL/ alloy
Temperature of Test solution	30°C ± 2°C
Aeration/Agitation	None
Type of Vessel	Flask sealed with high vacuum grease and condenser
Duration of Test	72 hours
Chemical Name	SRS+RTD
Specimen Form/Surface Area	1.3cm x 7.1cm metal coupon, 18.5 cm^2
Specimen Form/Surface Area	2.5cm x 5 cm metal coupon, 25cm^2
Surface treatment	Acetone rinse prior to collection of initial mass value

ANDERSON LABORATORIES, INC.

Michael Porfilio
Director of Operations / CI
NDE Level III / Certified Lead Auditor

Lori M. Felber
Quality Assurance Manager
Certified Lead Auditor

BMC

The above tests were performed using one or more of the following specifications: ASTM A48, A247, A262, A370, B117, B328, B368, B748, E2 (SM 11-22), E3, E8, E9, E10, E18, E21, E23, E34, E45, E92, E112, E212, E290, E340, E350, E352, E353, E381, E384, E404, E407, E415, E562, E663, E766, E883, E986, E1019, E1024, E1077, E1086, E1251, E1508, G053, G154, ASME IX, AWS D1.1, MIL-S-867A, NAVSEA S9074-AQ-GIB-010/248, SAE J81, EN 10002 Part 1, EN 10045 Parts 1 & 2, EN 10204 Section 3.1.C, and Anderson Laboratories' Quality Manual Revision K dated 10/12/09. This report shall not be reproduced except in full, without the written approval of Anderson Laboratories, Inc. Results reported apply only to the sample submitted

Section 6: Product Justification Documentation — Fuel and Emissions Reduction

Clean Boiler Waterside Heat Transfer Surfaces

Monitor Flue Gas Temperature

An indirect indicator of scale or deposit formation is flue gas temperature. If the flue gas temperature rises (with boiler load and excess air held constant), the effect is possibly due to the presence of scale.

Perform Visual Inspections

Visually inspect boiler tubes when the unit is shut down for maintenance. Scale removal can be achieved by mechanical means or acid cleaning. If scale is present, consult with your local water treatment specialist and consider modifying your feedwater treatment or chemical additives schedule.

Even on small boilers, the prevention of scale formation can produce substantial energy savings. Scale deposits occur when calcium, magnesium, and silica, commonly found in most water supplies, react to form a continuous layer of material on the waterside of the boiler heat exchange tubes.

Scale creates a problem because it typically possesses a thermal conductivity an order of magnitude less than the corresponding value for bare steel. Even thin layers of scale serve as an effective insulator and retard heat transfer. The result is overheating of boiler tube metal, tube failures, and loss of energy efficiency. Fuel waste due to boiler scale may be 2% for water-tube boilers and up to 5% in fire-tube boilers. Energy losses as a function of scale thickness and composition are given in the table below.

Energy Loss Due to Scale Deposits*

Scale Thickness, inches	Fuel Loss, % of Total Use		
	Scale Type		
	"Normal"	High Iron	Iron Plus Silica
1/64	1.0	1.6	3.5
1/32	2.0	3.1	7.0
3/64	3.0	4.7	–
1/16	3.9	6.2	–

Note: "Normal" scale is usually encountered in low-pressure applications. The high iron and iron plus silica scale composition results from high-pressure service conditions.
*Extracted from National Institute of Standards and Technology, Handbook 115, Supplement 1.

Example

A boiler annually uses 450,000 million Btu (MMBtu) of fuel while operating for 8,000 hours at its rated capacity of 45,000 pounds-per-hour (lbs/hr) of 150-psig steam. If scale 1/32nd of an inch thick is allowed to form on the boiler tubes, and the scale is of "normal" composition, the table indicates a fuel loss of 2%. The increase in operating costs, assuming energy is priced at $3.00/MMBtu, is:

Annual Operating Cost Increase = 450,000 MMBtu/year x $3.00/MMBtu x 0.02
= **$27,000**

Steam Tip Sheet information adapted from material provided by the Industrial Energy Extension Service of Georgia Tech and reviewed by the DOE BestPractices Steam Technical Subcommittee. For additional information on steam system efficiency measures, contact the OIT Clearinghouse at (800) 862-2086.

OFFICE OF INDUSTRIAL TECHNOLOGIES
ENERGY EFFICIENCY AND RENEWABLE ENERGY • U.S. DEPARTMENT OF ENERGY

Suggested Actions

Any scale in a boiler is undesirable. The best way to deal with scale is not to let it form in the first place. Scale formation is prevented by:

- Pretreatment of boiler make-up water (using water softeners, demineralizers, and reverse osmosis to remove scale-forming minerals),
- Chemical injection into the boiler feedwater, and
- Adopting proper boiler blowdown practices.

About DOE's Office of Industrial Technologies

The Office of Industrial Technologies (OIT), through partnerships with industry, government, and non-governmental organizations, develops and delivers advanced energy efficiency, renewable energy, and pollution prevention technologies for industrial applications. OIT is part of the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy.

OIT encourages industry-wide efforts to boost resource productivity through a strategy called Industries of the Future (IOF). IOF focuses on the following nine energy- and resource-intensive industries:

- Agriculture
- Aluminum
- Chemicals
- Forest Products
- Glass
- Metal Casting
- Mining
- Petroleum
- Steel

OIT and its BestPractices program offer a wide variety of resources to industrial partners that cover motor, steam, compressed air, and process heating systems. For example, BestPractices software can help you decide whether to replace or rewind motors (MotorMaster+), assess the efficiency of pumping systems (PSAT), or determine optimal insulation thickness for pipes and pressure vessels (3E Plus). Training is available to help you or your staff learn how to use these software programs and learn more about industrial systems. Workshops are held around the country on topics such as "Capturing the Value of Steam Efficiency," "Fundamentals and Advanced Management of Compressed Air Systems," and "Motor System Management." Available technical publications range from case studies and tip sheets to sourcebooks and market assessments. The *Energy Matters* newsletter, for example, provides timely articles and information on comprehensive energy systems for industry. You can access these resources and more by visiting the BestPractices Web site at **www.oit.doe.gov/bestpractices** or by contacting the OIT Clearinghouse at **800-862-2086** or via email at **clearinghouse@ee.doe.gov.**

BestPractices is part of the Office of Industrial Technologies' (OIT's) Industries of the Future strategy, which helps the country's most energy-intensive industries improve their competitiveness. BestPractices brings together the best-available and emerging technologies and practices to help companies begin improving energy efficiency, environmental performance, and productivity right now.

BestPractices focuses on plant systems, where significant efficiency improvements and savings can be achieved. Industry gains easy access to near-term and long-term solutions for improving the performance of motor, steam, compressed air, and process heating systems. In addition, the Industrial Assessment Centers provide comprehensive industrial energy evaluations to small and medium-size manufacturers.

FOR ADDITIONAL INFORMATION, PLEASE CONTACT:

Peter Salmon-Cox
Office of Industrial Technologies
Phone: (202) 586-2380
Fax: (202) 586-6507
Peter.Salmon-Cox@hq.doe.gov
www.oit.doe.gov/bestpractices

OIT Clearinghouse
Phone: (800) 862-2086
Fax: (360) 586-8303
clearinghouse@ee.doe.gov

Please send any comments, questions, or suggestions to webmaster.oit@ee.doe.gov

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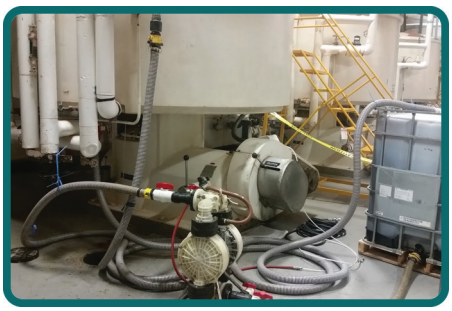
Office of Industrial Technologies
Energy Efficiency
and Renewable Energy
U.S. Department of Energy
Washington, DC 20585-0121

DOE/GO-10099-952
Revised June 2001
Steam Tip Sheet #7

Section 7: Pumping Systems

Delta Pump Systems



Safely Cleaning Pipes

DELTA PRODUCTS GROUP

Delta Pumping Systems are designed specifically for circulation of Delta Product's descalers and multiple other products. With several different capacities available, as well as custom job-specific modifications, Delta makes the right pump for any cleaning job. These custom pump configurations are user friendly, designed for simplicity and ease. ***Delta Pumps*** are a fraction of the cost of our competitors circulating systems because our products are safe on most materials found in a typical pump.

- Flo-jet: Tubing pump that is small and suitable for instant hot water heaters and institutional use
- Hayward: 1 HP pump for most all of the industrial applications
- Yamada: 1 1/2" and 2" air diaphragm pumps used for large operations or whole plant circulation
- Drum Pump: A simple transport pump used for the transfer of chemicals (not for circulation)

Additional *Delta Pump Systems*

DELTA PRODUCTS GROUP • P.O. Box 6466 • Aurora, IL 60598-0466
www.deltaproducts.com • 888-DESCALE

The Delta Pumping Systems

Delta offers the finest and most complete line of pumping options for descaling operations. Our many years of experience enables us to design pumping systems that are efficient and easily assembled.

We offer a variety of capacities to fit your particular application. If you need assistance in determining the most efficient combination of equipment volume and pumping capacity, call our team of experts. We'll help you plan a maintenance program to improve your equipment's peak operating efficiency.

These completely assembled pumps are ideally suited to all Delta Descaler Cleaning operations

Delta Pumping Systems are available in three different configurations designed to meet your specific needs

Accessory Upgrades and optional configurations are encouraged to further ease your workload and increase efficiencies

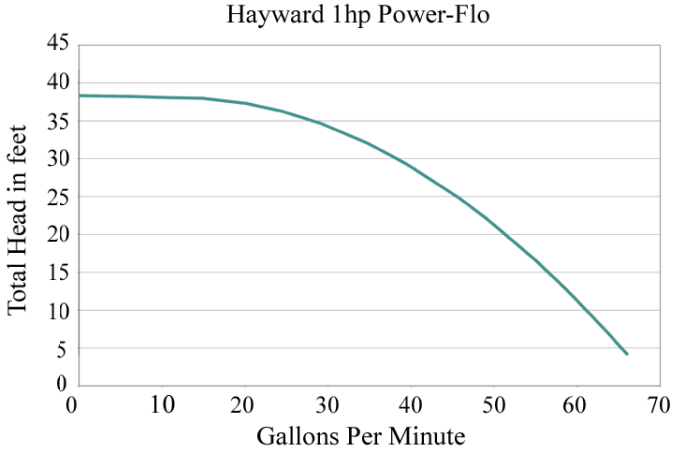
The versatility of Delta Descalers covers a very wide range of applications. Choose the optimum performance for your needs. Don't settle for less than the best. Custom configurations are user designed for simplicity and ease.

Delta Pumping Systems

Delta offers the finest and most complete line of pumping options for descaling operations. Our many years of experience enable us to design pumping systems that are efficient and easily assembled.
We offer a variety of capacities to fit your particular applications. If you need assistance in determining the most efficient combination of equipment volume and pumping capacity, call our team of experts. We'll help you plan a maintenance program to improve your equipment's peak operating efficiency.

Pump Cart System: *One horsepower pump 115V, 30gal shipper/recirculation bucket, 3x10' hose with 1" Female fittings. Appropriate valves, piping and fittings are included to accommodate bucket and connections. Pump and bucket mounted on a 2' by 4' Rubbermaid heavy-duty plastic cart with 8" swivel wheels, drain with valve mounted on bucket for ease of disposal.*

Pump Complete: *One horsepower pump 115V, 30gal shipper/recirculation bucket, three 10' hose with 1" Female fittings. Appropriate valves, piping and fittings are included to accommodate bucket and connections.*



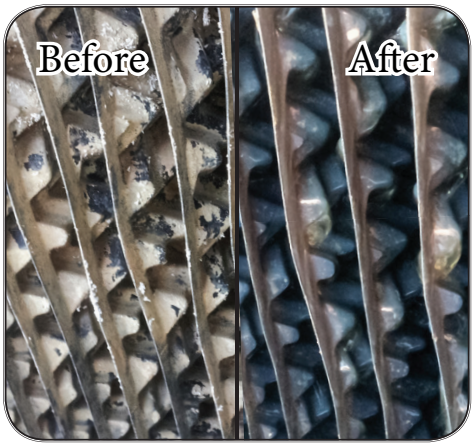
P.O. Box 6466 • Aurora, IL 60598-0466 • Phone: 888-337-2253 • Fax: 630-264-9741 • solutions@deltaproducts.com

Delta Products Group

888-DESCALE (337-2253)

Descaling with Delta Products Group

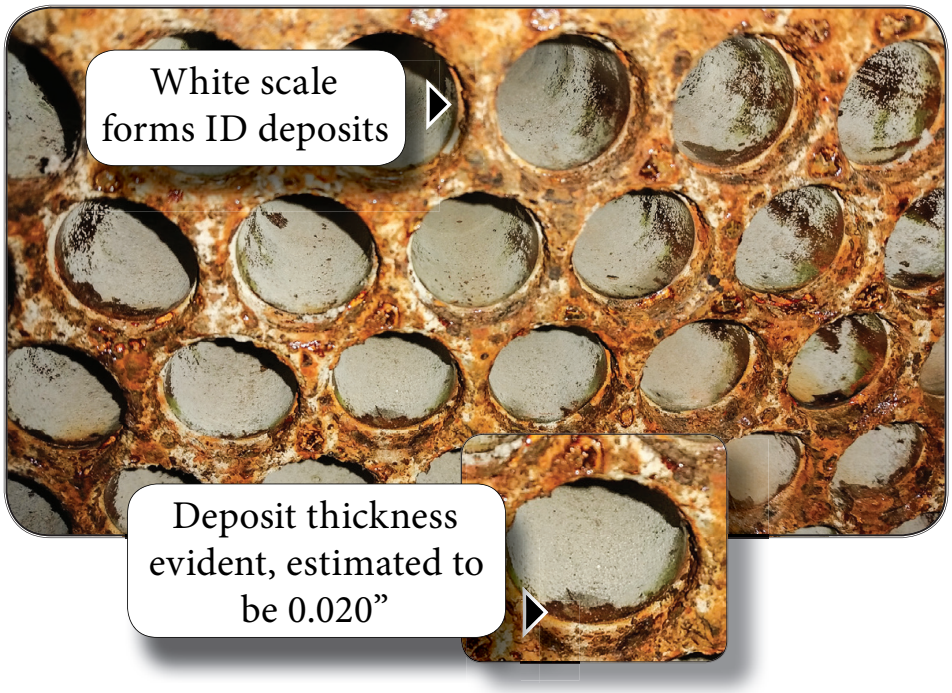
A visual presentation for why, when, and how to clean a heat transfer system using ***SDS+RTD***.



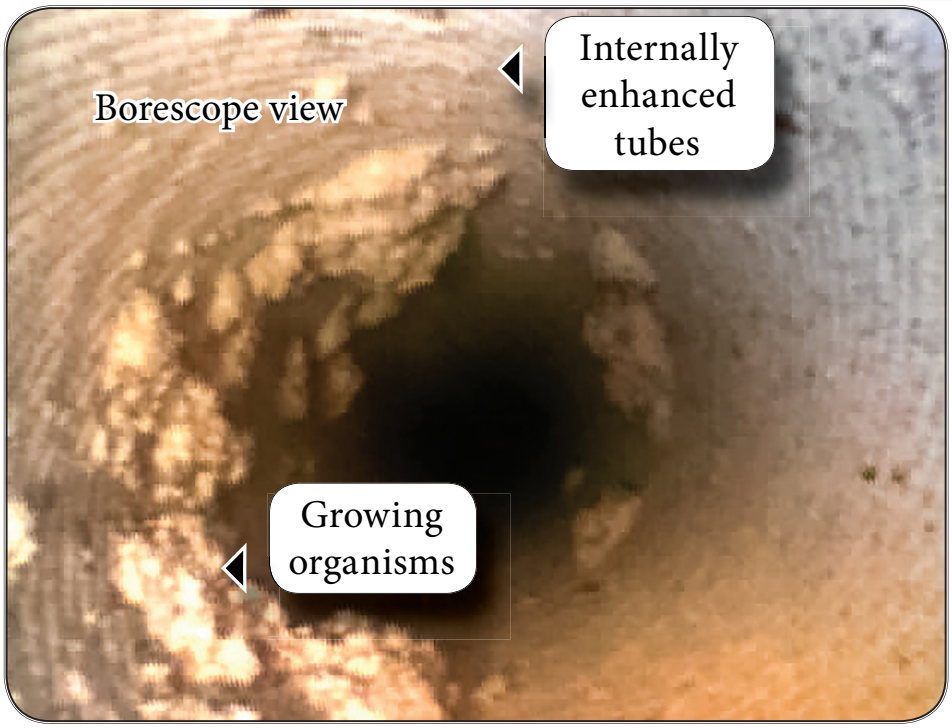
Clean is better, safe is best!

Scale Never Sleeps

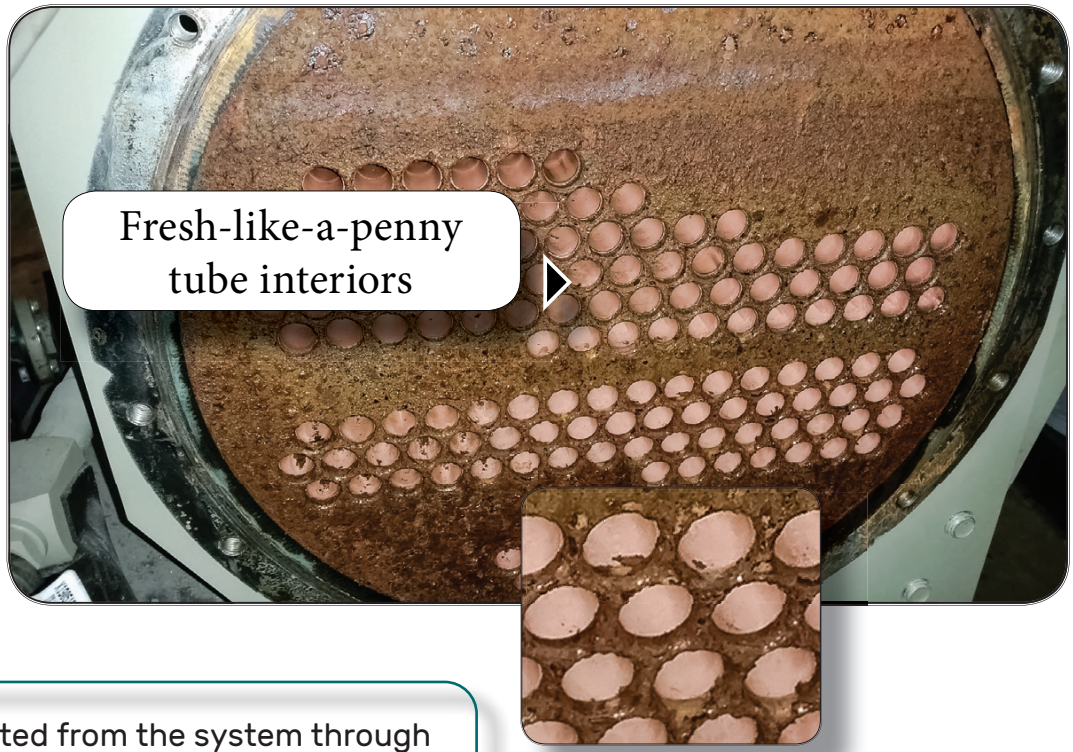
Campus Chiller



When water changes temperature, minerals in the water may attach to the surface of the water’s container. These minerals tend to build upon themselves to form coral reef-like structures. These structures can become a breeding ground for organisms.



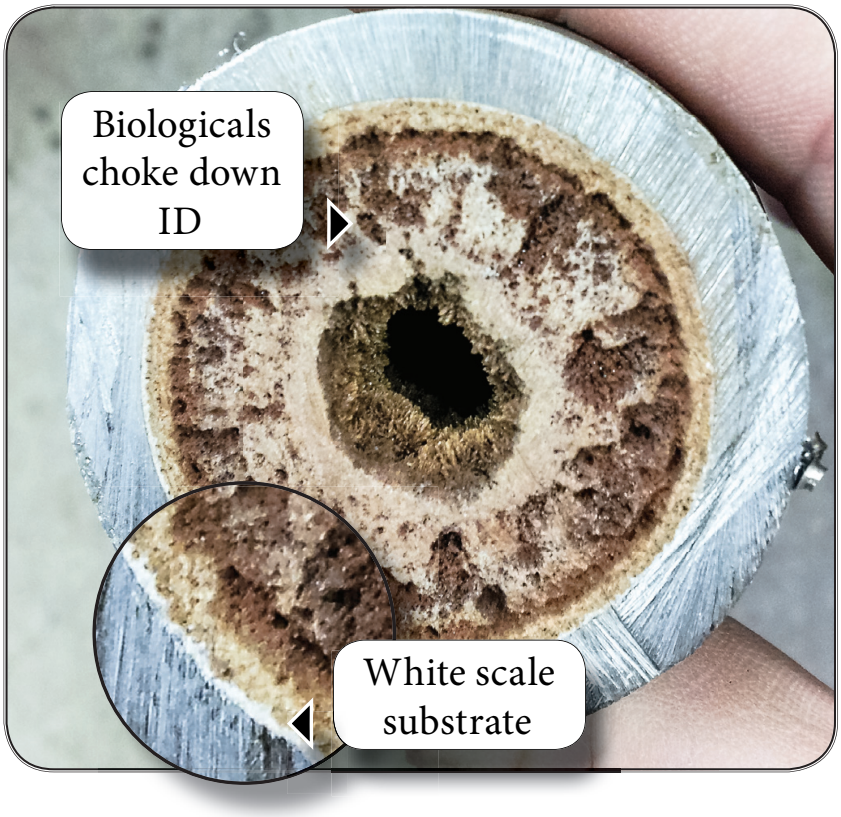
Descaling Results



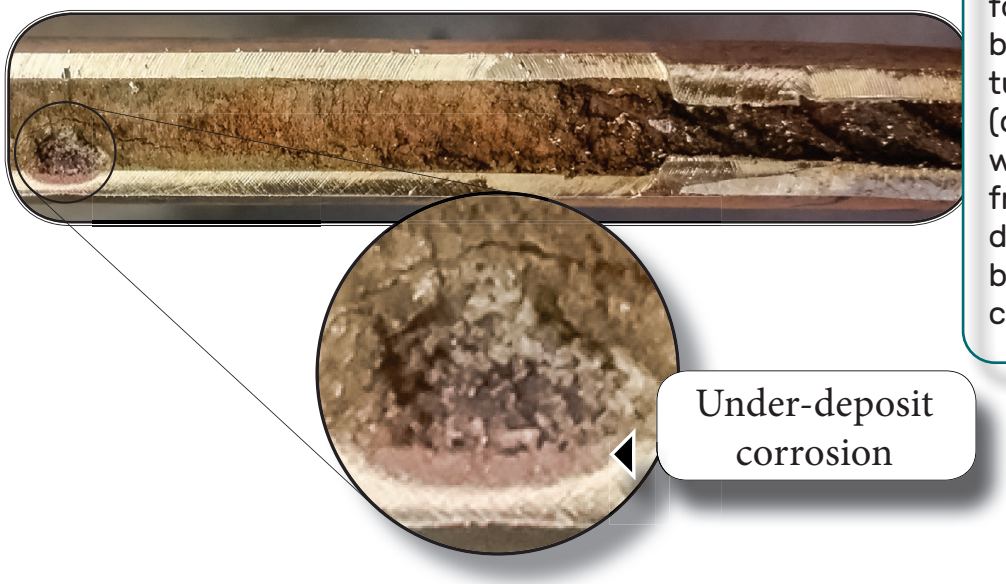
Organisms are evicted from the system through the removal of mineral deposits. Once they're removed, the equipment is restored to peak efficiency. In the image below, the debris that had been filling the tube's ID rifling was cleared.

Biologicals' Coral Reef

Women's Prison Pipe Sample



Hospital Hot Water Exchanger

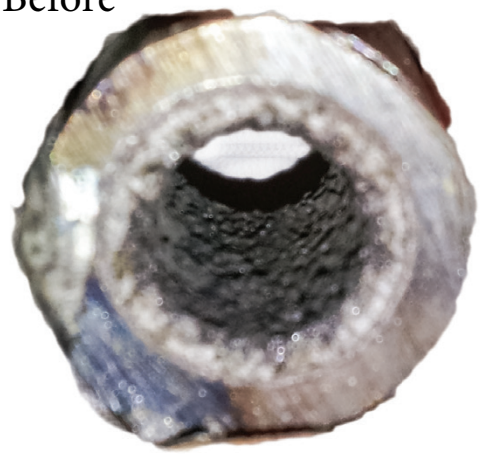


These two images show extreme conditions. The top image captures the progression of scale. Beginning with the coral reef effect (the lighter solid ring against the tube ID) we see that biologicals have taken hold. The elapsed time from a simple eggshell feature to a severely restricted and choked pipe is unknown.

Clearing a choked pipe with a liquid, like ***SDS+RTD***, tends to beat drilling a clogged pipe.

In the bottom image, a drill snapped off, and the tube needed to be pulled from service. Once machined open for inspection, the beginning of an ID tube pit was revealed (called out region). The wall loss percentage from under pitting and deposit corrosion can be determined by eddy current tests.

Before



After

Under-deposit corrosion thins pipe walls

Less chemistry and less circulation time will be needed if buildup is caught earlier rather than later in the fouling process.

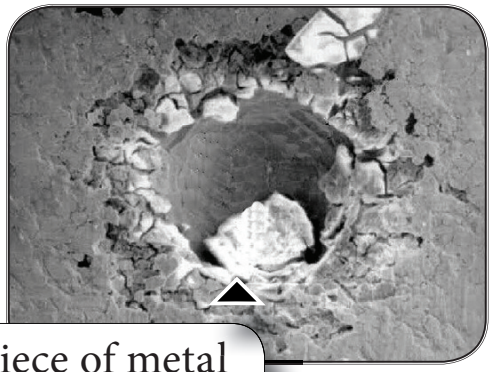
Removing the deposit early affords the scale less opportunity to take hold; therefore, less ID pitting should be expected.

This cross-sectioned pipe shows how pipe walls are degraded by corrosion.

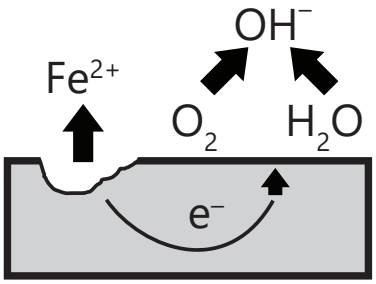
Delta Products Group offers the client the option to clean — rather than replace — piping.

Deposit Corrosion and Pitting

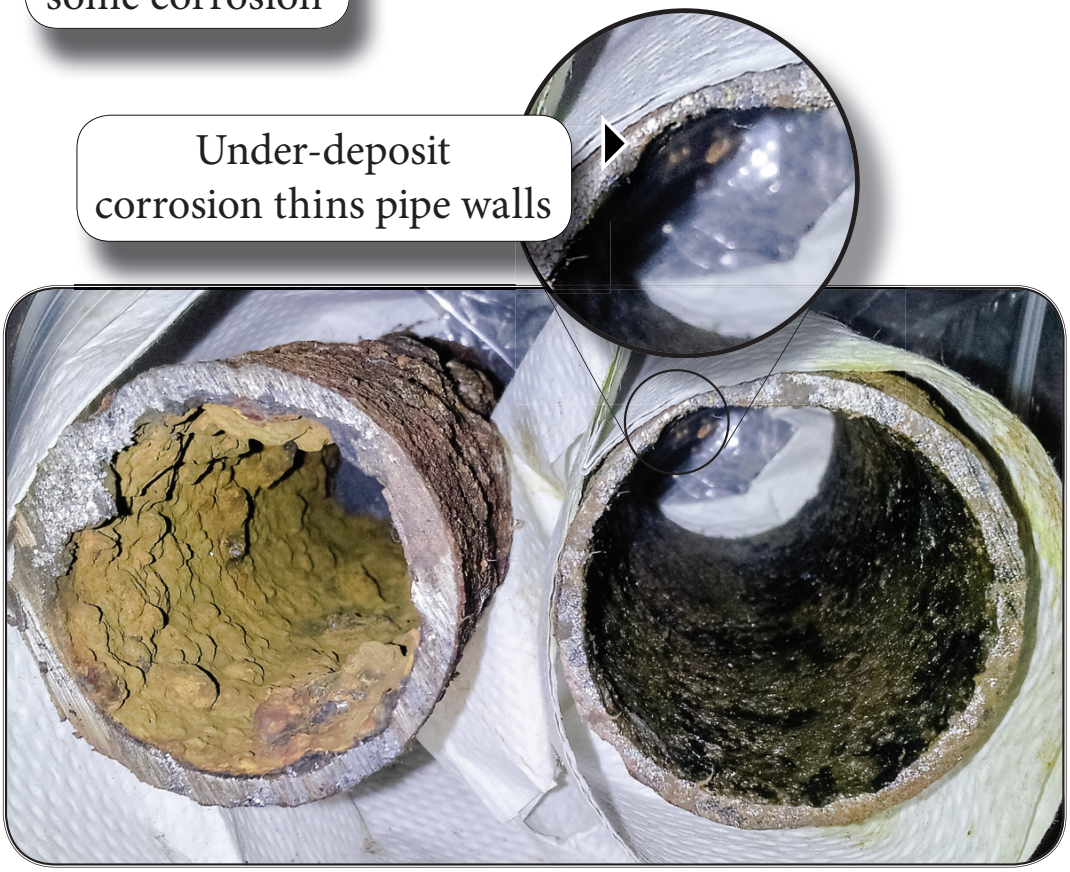
Under-deposit corrosion and pitting occur when metals give up electrons. Localized and aggressive, corrosion can be accelerated by the presence of scale.



Piece of metal still attached by some corrosion



Under-deposit corrosion thins pipe walls



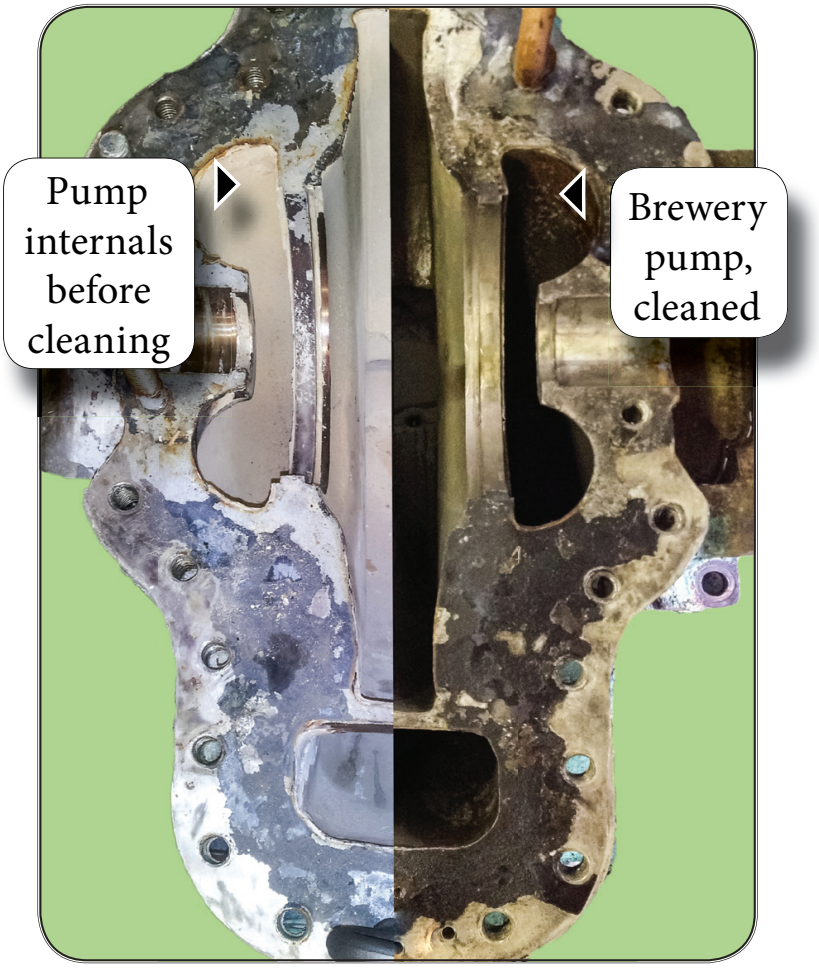
Non-Corrosive Chemistries

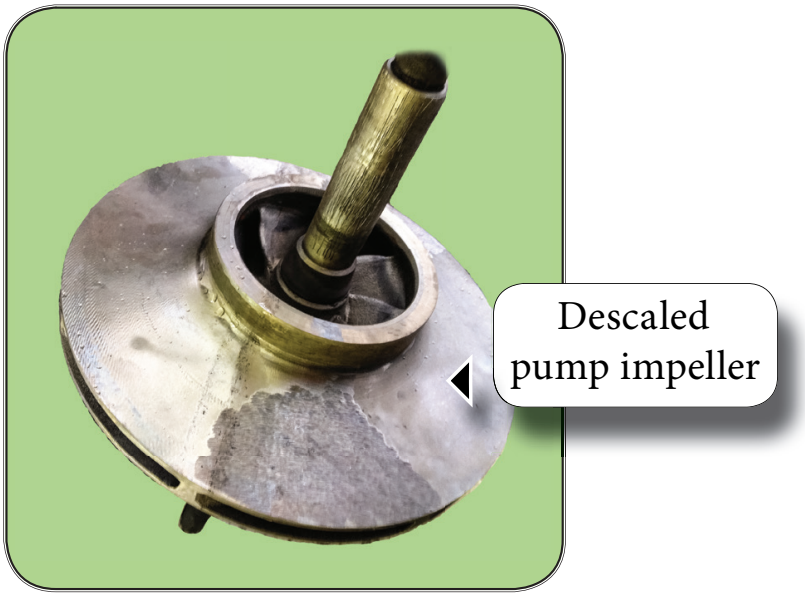
Descaling Test: Rotten Pipe

As shown below, the ***SDS+RTD*** descaler from Delta Products Group did not touch any fresh metal — only the Fe_2O_3 is dissolved.

Food-safe

Brewery Pump

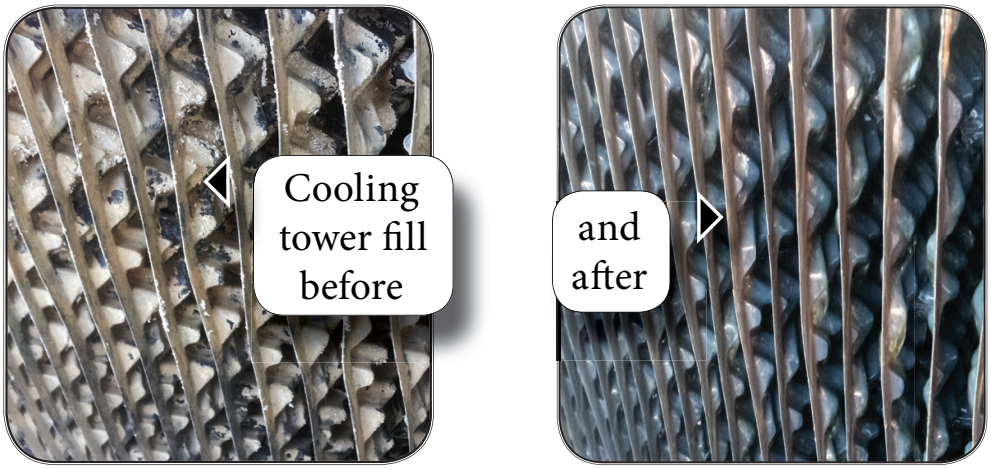




Material-safe

Cooling Towers

Delta's products will not harm copper, other metals, plastics, O-rings, gaskets, or wood and fiber.



Cleaning, before and after. We also clean hot-deck, nozzles, basin, and associated piping.

Plate and Frame Exchangers

City High-rise

Oxides fouling a strainer dollar plate

SDS+RTD removes scale deposits and iron oxide, revealing the unit's protective coating.

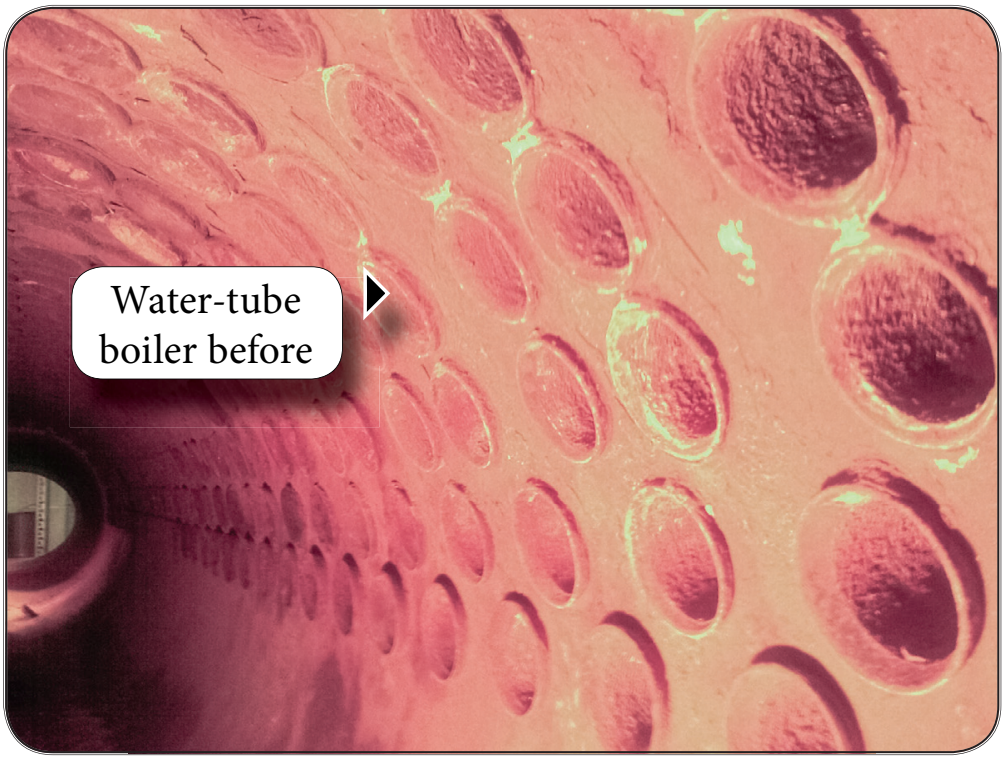
Extent of under-deposit corrosion is plain to see after cleaning

Sewer-safe

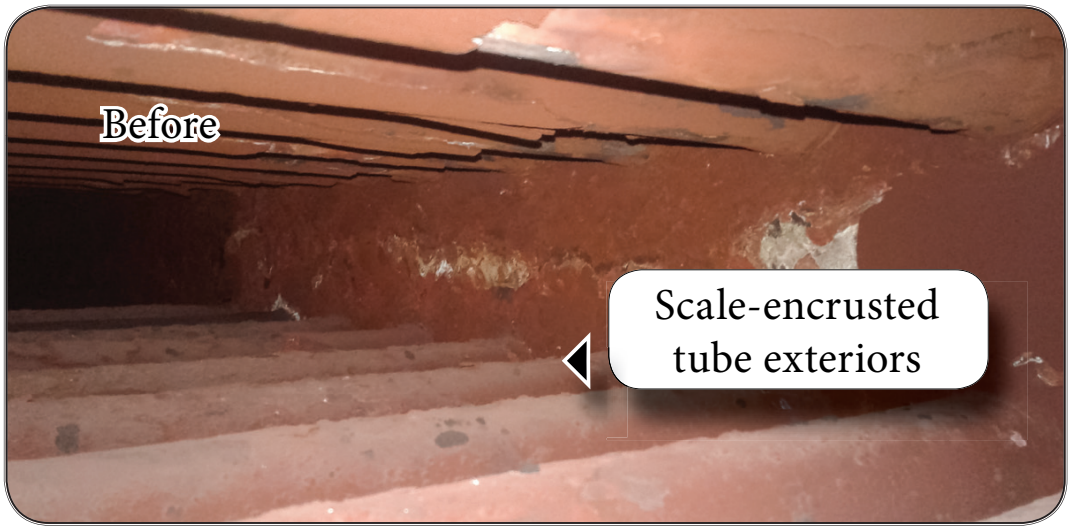
County Prison

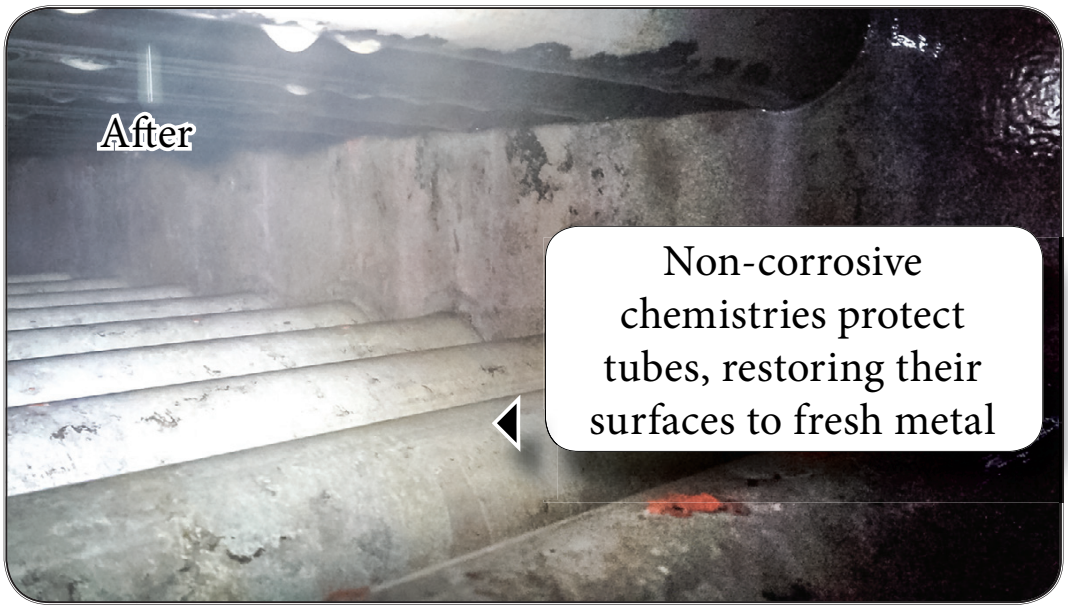
SDS+RTD dosages are calculated from the *known* heating surface area and *estimated* scale thickness.

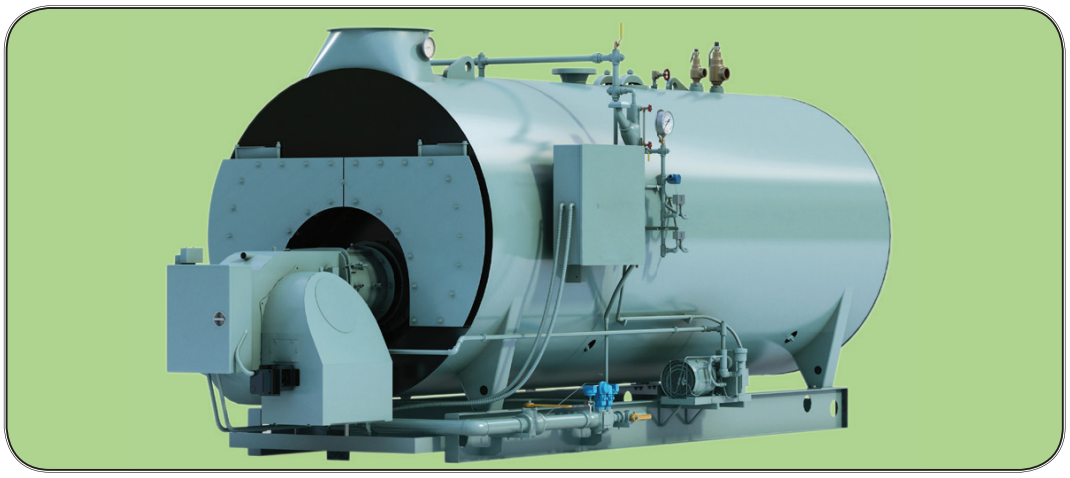
Scale is removed layer by layer. In this case, removal reveals the topographical elements to scale formation.



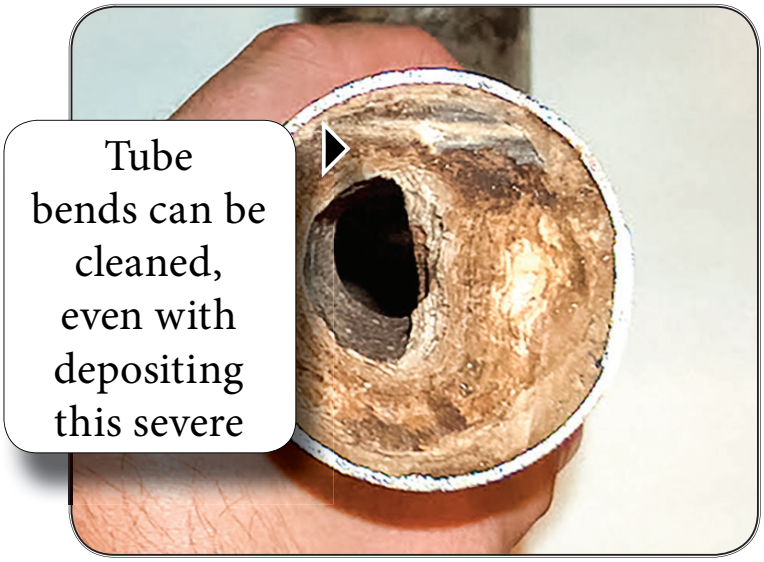
Fire-tube Boiler



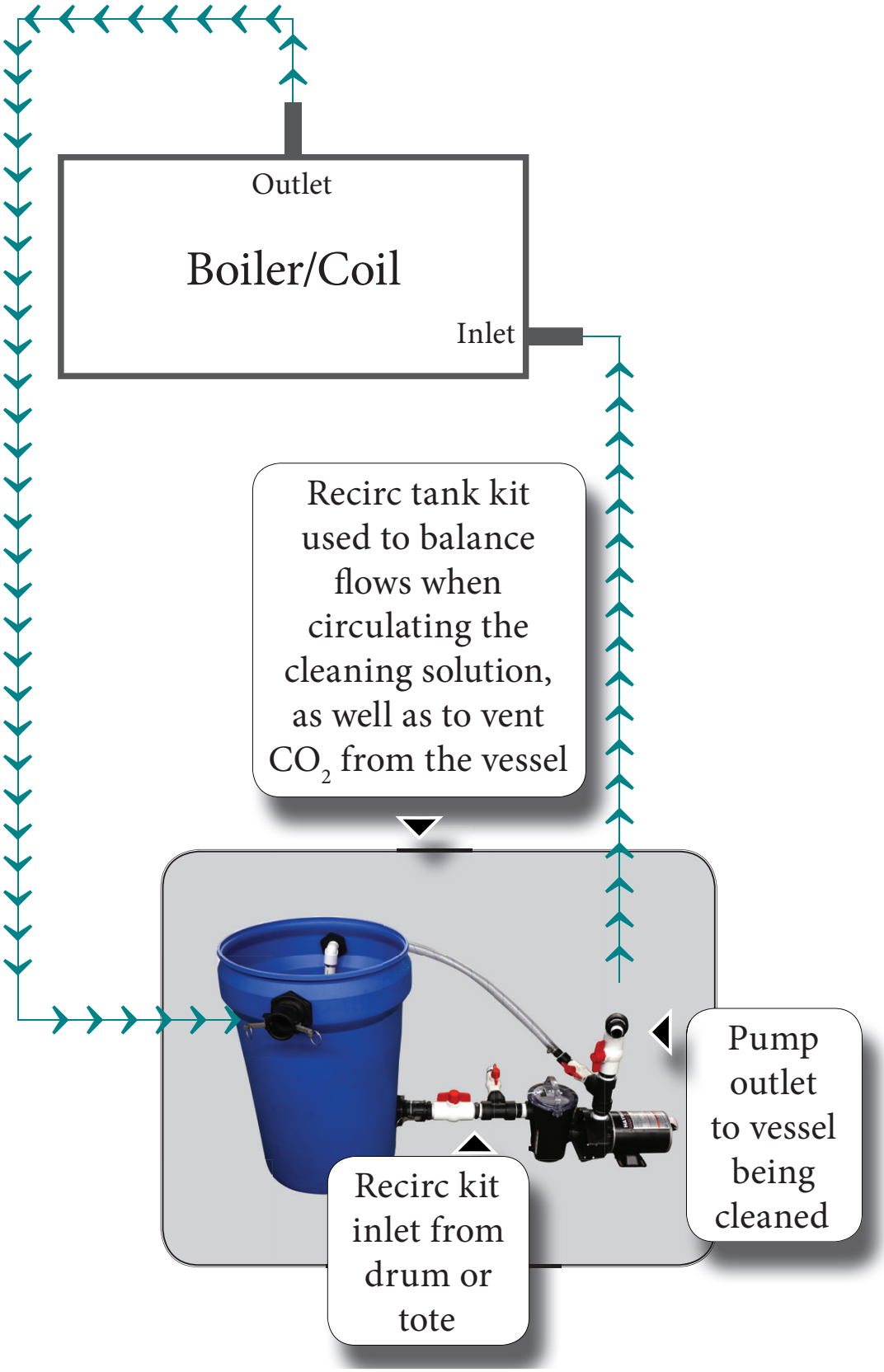




Brewery Wort Line

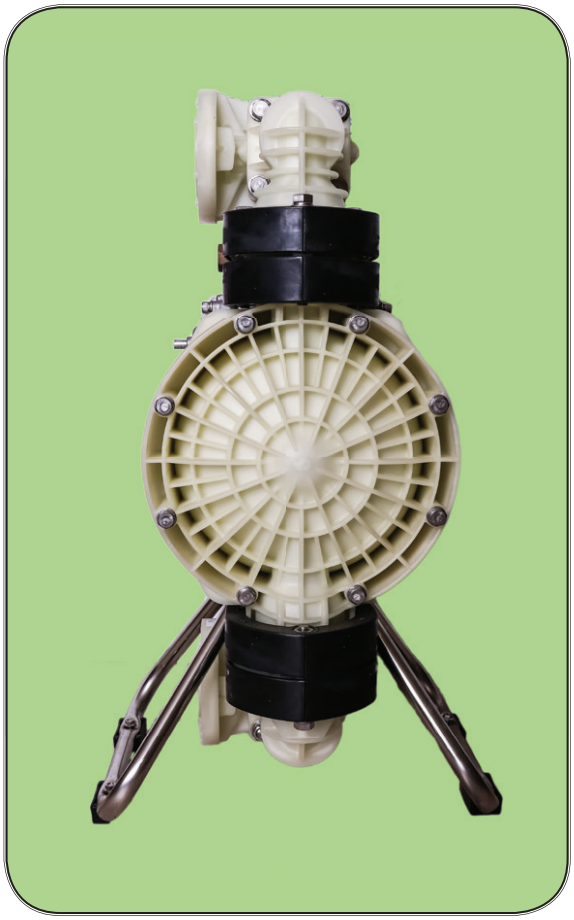


The Delta Circulating Kit



The ***SDS+RTD*** product is stirred in the process using a pump and an open vessel.

This allows the process to off-gas, thus preventing the vessel from becoming air-bound.



Our 2” Air Diaphragm Pump Requires
100 PSI at 50 CFM

Several Circulation Options

Sump Pump

1 HP
Electric Pump

2” Air Diaphragm
Pump

Available in These Sizes

5-Gal. Jugs

55-Gal. Drums

275-Gal. Totes

330-Gal. Totes

Pumps Available for Sale or Rent

Sump Pump

1 HP Electric Pump

2" Air Diaphragm Pump

Delivery Options

SHIP TO: _____ C/O: _____

_____

_____

ATTN: _____ CELL: _____

Dock Available? ☐ Yes

Lift Truck Required? ☐ Yes Appointment Required? ☐ Yes

Chemistry weight: Approximately 8.6 lbs/gallon

FOB: Aurora, IL 60506
2 to 4 Days ARO via Common Carrier

How to Perform a Descaling Dosage Calculation

Boilers

A. Heating Surface Area (HSA) Method

Descaler Quantity in Gallons =

(____Sq. Ft. HSA) X (_____ in. Scale) X 5 = _____Gal.

B. Boiler Horse Power Method

Descaler Quantity in Gallons =

(____Horse Power) X (_____ in. Scale ÷ 0.031") = _____ Gal.

Heat Exchangers

Heat Exchanger Internal Volume Method

Descaler Quantity in Gallons for 50% Concentration =

(____Gallons Internal Volume X 0.40) X 0.50 = Gal.

Cooling Towers

One Gallon for Every 3 to 4 Tons of Cooling Capacity

Descaler Quantity in Gallons =

(____Tons of Cooling) ÷ 4 =____Gal. (Light to Moderate Fouling)

OR . . .

(____Tons of Cooling) ÷ 3 =____Gal. (Heavy Fouling)

Pipes

Internal Volume Method

Internal Volume in Gallons =

(Pipe ID in Feet/2) X π X Pipe Length in Feet X 7.4805 Gal/Ft^3

Descaler Quantity in Gallons =

(____Gallons Internal Volume) X 0.5 = _____ Gal.

For a more accurate estimation, consult Thermal Solutions. Pictures and samples are very helpful.

Vessel Cleaning Overview

1. Identify and size vessel to be cleaned.
2. Estimate degree of vessel fouling.
3. Calculate quantity of chemical needed to remove fouling.
4. Fill the vessel with water and chemical.
5. Circulate chemical as directed.
6. Flush with water, rinsing until clear.
7. For full, step-by-step, procedures consult our sales representative.

Critical Cleaning Operations: Site Support Available

- Free site evaluation for chemical selection and application
- Free technical support, 24/7/365.24
- On-site technical support exceeding four (4) hours available (charges may apply)
- Full project management available (charges apply)

Savings from Boiler Cleaning

Reduced Fuel Consumption			
Scale Thickness, Inches	Fuel Loss, % of Total Use		
	Scale Type		
	"Normal"	High Iron	Iron Plus Silica
1/64	1.0	1.6	3.5
1/32	2.0	3.1	7.0
3/64	3.0	4.7	—
1/16	3.9	6.2	—

Source: U.S. DOE

Reduced Risk of Under-deposit Corrosion (pitting)

Reduced Risk of Metal Fatigue from Overheating

To Order, Call 888-DESCALE (337-2253)

Thermal Solutions, Inc.
2525 Interchange Road
Lehighton, PA 18235
www.tubeandpipetools.com

- The information contained in this document is approved for public release.
- All information, reports, and official documents were compiled specifically for the use of the ***SDS+RTD*** product in water-based equipment at commercial, light industrial, and heavy industrial locations.
- ***SDS+RTD*** is a liquid descaler designed to remove the fouling from scale deposits in a variety of water-based equipment.
- This booklet may be used to promote ***SDS+RTD*** for efficiency gains and fuel consumption reduction.
- If using ***SDS+RTD*** at oil refineries, pharmaceutical plants, power generation facilities, steam production sites, chilled water production sites, or with hospital or college HVAC systems, particular characteristics specific to the location can be reviewed by the Delta Products Group team.
- Call 888-DESCALE for specific references or for assistance in the specification or use of ***SDS+RTD*** for your applications. The most common applications are covered in this booklet.

Delta Products Group offers technical support worldwide.

Locally, please contact :