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Vessel Critical Profile

Name/ BADGER Primary VIN/ 265156 Call/ WBD 4889 Flag/ US

Alt VIN's	Type
265156	Official Number (U.S.)
5033583	IMO Number
5300348	ABS Number

---Involved Parties---

Role	Name	Party Id
Flag State	UNITED STATES	833031
Owner	LAKE MICHIGAN TRANS LAKE SHORTCUT	486233
Operator (managing)	LAKE MICHIGAN CARFERRY Terminal	486234
Managing Owner	LAKE MICHIGAN TRANS-LAKE SHORTCUT	447158
Operator (managing)	JAMES ANDERSON	1036680
Operator (managing)	ALLAN PETER CHRENKA	1287520
perator (managing)	DEAN GLENN HOBBS	1091864
anaging Owner (Trustee)	LAKE MICHIGAN TRANS-LAKE SHORTCUT	447158

---Vessel Specifics---

Service/ Passenger (Inspected)
Propulsion/ Steam Reciprocating
Route/ GG: Great Lakes
Ahead HorsePower/ 7000
Astern HorsePower/
Class/ Passenger Ship

Gross Tons(GT ITC)/
Gross Tons(GRT)/ 4244
Deadweight Ton/ 6650
Length/ 393.7 (ITC)/
Super Structure Color/
Type/ Ferry

Hailing Port/ LUNDINGTON, MI,
Date Keel Laid/
Date Delivered/ 15Dec1953
Hull Material/ Steel
Hull Color/ Black
SubType/ General (More Than 6, Gross Tonnage < 100)

---VDS Documents---

Document	Activity #	Agency	Port	Issued	Expires	Status
CERTIFICATE OF DOCUMENTATION		USCG	CLEVD	17Jan2007	29Feb2008	VALID

---Certificate/Document Status---

ocument	Activity #	Agency	Port	Issued	Expires	Status

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Document	Activity #	Agency	Port	Issued	Expires	Status
Certificate of ;pection	2909379	USCG	Marine Safety Unit Chicago	10May2007	10May2008	Issued/Effective
;assification Document		American Bureau of S	Houston, Tx	03Nov2003	29Nov2008	VALID
Load Line Certificate (Coastwise)		American Bureau of S	Houston, TX	15Jan2004	29Oct2008	VALID
Stability Letter			Marine Safety Center	14May1964		VALID
Vessel Security Plan Approval Letter		USCG	MSC	13May2004	13May2009	VALID
Vessel Security Plan (VSP) - SSI		USCG	MSC	13May2004	13May2009	VALID

---Hull and Re-inspections---

Internal Structural Next Due Date/
DryDock Next Due Date/ 31Oct2008
Wood Keel Bolt Next Due Date/

---Open Cases---

Total Cases/ 2

1. Case #/ 349380 Orig Port/ SFO GrndHvn Open Dt/ 15May2007
   Title/ M Equipment Failure/BADGER/ Ludington 00 00.0 S 000 00.0 W/151418ZMAY07
   Activities involved/ 2931307 and 2937021 and 2937191
   Status/ Open - In Progress
   Case Description/ M/V Badger notified Station Ludington of machinery failure. The cause of the failure is believed to be from the Continues blows root valve. The valve released steam from the boiler system and injured the second en (See Notification Incident Description)
2. Case #/ 348403 Orig Port/ SEC LkMichgn Open Dt/ 09May2007
   Title/ M Pollution - Hazardous Material/SS Badger/ Pier Marquette Lake, Ludington MI. /092000ZMAY07
   Activities involved/ 2926406 and 2932991
   Status/ Open - In Progress
   Case Description/ During a Coast Guard inspection, while activating the sprinkler system the SS Badger spilled some run off into the lake which created a sheen on the pier Marquette Lake. The sheen consisted of painted asphalt from t (See Notification Incident Description)

---All Open Activities---

Total Open Activities/ 7

1. Activity #/ 2970215 Orig Port/ MSU Chicago Owner Port/ MSU Chicago Start Dt/ 22Jun2007
   Role Type/ Subject to Marine Inspection Activity Type/ Vessel Inspection/PSC
   Activity Subtypes/ ADMIN
   Status/ Open - Returned for Revision Date Status Last Changed/ 17Jul2007

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Notes (Truncated)/ Received inquiry into SS Badger Ash discharge into Lake Michigan from Mr. Stephan Fabian (Wisconsin DNR environmental crimes). Mr. Fabian was researching if the vessel was authorized to discharge. ntacted Mr. Bob Manglitz CEO of Lake Michigan Car ferry (Badger). Also Contacted LCDR Firing D9 M. Per 40 R 122.3 vessel is permitted to discharge ash in the waters of the Great Lakes. See

2. Activity #/ 2932991 Orig Port/ SFO GrndHvn Owner Port/ SFO GrndHvn Start Dt/ 17May2007
   Role Type/ Acknowledged Pollution Source Activity Type/ Incident Investigation
   Status/ Open - In Progress Date Status Last Changed/ 17May2007
   Notes (Truncated)/
3. Activity #/ 2937191 Orig Port/ SFO GrndHvn Owner Port/ MSU Chicago Start Dt/ 15May2007
   Role Type/ Involved in a Marine Casualty Activity Type/ Incident Investigation
   Status/ Open - In Progress Date Status Last Changed/ 15May2007
   Notes (Truncated)/
4. Activity #/ 2833663 Orig Port/ SEC LkMichgn Owner Port/ COMDT 3PCA Start Dt/ 22Sep2006
   Role Type/ Involved in a Marine Casualty Activity Type/ Incident Investigation
   Status/ Open - Submitted for Review Date Status Last Changed/ 28Feb2007
   Notes (Truncated)/
5. Activity #/ 2486622 Orig Port/ MSD GrndHvn Owner Port/ MSD GrndHvn Start Dt/ 07Sep2005
   Role Type/ Involved in a Marine Investigation (non-casualty) Activity Type/ Enforcement
   Activity Subtypes/ S&R
   Status/ Open - Suspended Date Status Last Changed/ 20Dec2005
   Notes (Truncated)/
6. Activity #/ 2486495 Orig Port/ MSD GrndHvn Owner Port/ COMDT 3PCA Start Dt/ 28Aug2005
   Role Type/ Involved in a Marine Investigation (non-casualty) Activity Type/ Incident Investigation
   Status/ Open - Submitted for Review Date Status Last Changed/ 20Dec2005
   Notes (Truncated)/
7. Activity #/ 1900125 Orig Port/ MSD GrndHvn Owner Port/ COMDT 3PCA Start Dt/ 18May2003
   Role Type/ Transiting Vicinity of Primary Subject Activity Type/ Incident Investigation
   Status/ Open - In Progress Date Status Last Changed/ 08Sep2003
   Notes (Truncated)/

---All Closed Activities (W/in 18 months)---

Total Closed Activities/ 38

1. Activity #/ 2960236 Orig Port/ MSU Chicago Owner Port/ MSU Chicago Start Dt/ 13Jun2007
   Role Type/ Subject to Marine Inspection Activity Type/ Vessel Inspection/PSC
   Activity Subtypes/ ADMIN
   Status/ Closed - Approved Inspection Date Status Last Changed/ 13Jun2007
   Notes (Truncated)/ Extended CG-835 requirements issued under COI activity per Chief Cart's written request. Items not extended are complete and pending CG attendance. CWO4 Jeff Carie
2. Activity #/ 2931307 Orig Port/ SFO GrndHvn Owner Port/ SFO GrndHvn Start Dt/ 15May2007
   Role Type/ Subject to Marine Inspection Activity Type/ Incident Management
   Status/ Closed - Agency Action Complete Date Status Last Changed/ 15May2007
   Notes (Truncated)/ M/V Badger notified Station Ludington of machinery failure. The cause of the failure is believed to be from the Continues blows root valve. The valve released steam from the boiler system and injured the second engineer. The second engineer recieved medical treatment and back on the vessel. SFO vessel inspectors in rout to observe repairs to the boiler system.
3. Activity #/ 2937021 Orig Port/ MSU Chicago Owner Port/ MSU Chicago Start Dt/ 15May2007
   Role Type/ Subject to Marine Inspection Activity Type/ Vessel Inspection/PSC
   Activity Subtypes/ DAMAGE SURVEY and REPAIRS
   Status/ Closed - Approved Inspection Date Status Last Changed/ 22May2007

Notes (Truncated)/ Attended SS Badger in her berth at Ludington, Michigan to conduct a Damage Survey after the Port After Boiler continuous blow down valve experienced a catastrophic failure causing personnel injury to the vessels cond assist engineer. This attendance was at the request of Sec LM and SFO Grand Haven. Interviews and written tements were conducted by LT Adams of SFO Grand Haven. Examined co

4. Activity #/ 2909379 Orig Port/ MSU Chicago Owner Port/ MSU Chicago Start Dt/ 09May2007
   Role Type/ Subject to Marine Inspection Activity Type/ Vessel Inspection/PSC
   Activity Subtypes/ CERTIFICATION and MTSA VER
   Status/ Closed - Approved Inspection Date Status Last Changed/ 03Jul2007
   Notes (Truncated)/ 17APR2007- Drafted and routed temp. COI CWO4 Jeff Carie 02MAY2007- Attended vessel moored stern to, Ludington Michigan in company of Chief Chuck Cart and Captain Kevin Fitch to begin inspection for certification. Deck - Initiated inspection, vessel was not in a ready condition as the crew had just come back. Full COI was scheduled for the following week. Conducted a check of lifesavin
5. Activity #/ 2838331 Orig Port/ SEC LkMichgn Owner Port/ SEC LkMichgn Start Dt/ 11Dec2006
   Role Type/ Involved in a Marine Casualty Activity Type/ Enforcement
   Activity Subtypes/
   Status/ Closed - Agency Action Complete Date Status Last Changed/ 28Feb2007
   Notes (Truncated)/
6. Activity #/ 2838308 Orig Port/ SEC LkMichgn Owner Port/ SEC LkMichgn Start Dt/ 11Dec2006
   Role Type/ Involved in a Marine Casualty Activity Type/ Enforcement
   Activity Subtypes/
   Status/ Closed - Agency Action Complete Date Status Last Changed/ 28Feb2007
   Notes (Truncated)/
7. Activity #/ 2825387 Orig Port/ MSU Chicago Owner Port/ MSU Chicago Start Dt/ 20Nov2006
   Role Type/ Subject to Marine Inspection Activity Type/ Vessel Inspection/PSC
   Activity Subtypes/ IN SERV INSP
   Status/ Closed - Approved Inspection Date Status Last Changed/ 14May2007
   Notes (Truncated)/ 13 Nov 2006: Attended vessel in attendance of Chief Engineer Chuck Curt to conduct 10 year iler mounting and waterside inspection. Vessel has four coal fired marine boilers manufactured by Foster-Wheeler Company. Inspected condition of all water wall headers, rear wall headers, inspection all seats and mounts, all sat. Inspected super heater (SH) headers, SH steam feed valves and gaske
8. Activity #/ 2786892 Orig Port/ SEC LkMichgn Owner Port/ SEC LkMichgn Start Dt/ 25Sep2006
   Role Type/ Involved in a Marine Casualty Activity Type/ Incident Management
   Status/ Closed - Agency Action Complete Date Status Last Changed/ 11Sep2006
   Notes (Truncated)/ Manitowoc, WI Harbor Waterway Name: LAKE MICHIGAN S/S BADGER grounded in the Manitowoc, WI harbor.
9. Activity #/ 2786900 Orig Port/ SEC LkMichgn Owner Port/ COMDT 385 Start Dt/ 11Sep2006
   Role Type/ Involved in a Marine Casualty Activity Type/ Incident Investigation
   Status/ Closed - Agency Action Complete Date Status Last Changed/ 10Jan2007
   Notes (Truncated)/
10. Activity #/ 2751880 Orig Port/ MSU Chicago Owner Port/ MSU Chicago Start Dt/ 04Aug2006
    Role Type/ Subject to Marine Inspection Activity Type/ Vessel Inspection/PSC
    Status/ Closed - Approved Inspection Date Status Last Changed/ 18Aug2006
    Notes (Truncated)/ 03AUG2006- Attended vessel in company of Chief Engineer Chuck Cart at vessels berth, Ludington, Mi. Cleared 4 outstanding requirements, none issued or remain outstanding. This vessel is fit for route and service on the COI. CWO4 Jeff Carie
11. Activity #/ 2738766 Orig Port/ MSU Chicago Owner Port/ MSU Chicago Start Dt/ 03Aug2006
    Role Type/ Subject to Marine Inspection Activity Type/ Vessel Inspection/PSC
    Activity Subtypes/ DEFICIENCY CK
    Status/ Closed - Approved Inspection Date Status Last Changed/ 21Aug2006
    Notes (Truncated)/ 03AUG2006- Attended vessel in company of Chief Engineer Chuck Cart in Ludington Mi. leared (4) CG-835 requiements issued during quarterly exam dated 24 JUL2006. No requirements issued, and none main outstanding. CWO4 Jeff Carie
12. Activity #/ 2731765 Orig Port/ SEC LkMichgn Owner Port/ SEC LkMichgn Start Dt/ 31Jul2006

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Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Activity Subtypes/
Status/ Closed - Agency Action Complete Date Status Last Changed/ 31Jul2006
Notes (Truncated)/ 30 July 06 Sector Lake Michigan conducted a security boarding on the F/V Badger. While underway from Milwaukee WI to Muskegon MI. Loading and unloading of passengers and vehicles where observed. No discrepancies or deficiencies were noted.

13. Activity #/ 2731683 Orig Port/ SEC LkMichgn Owner Port/ SEC LkMichgn Start Dt/ 30Jul2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Activity Subtypes/
Status/ Closed - Agency Action Complete Date Status Last Changed/ 31Jul2006
Notes (Truncated)/ 30 July 06 Sector Lake Michigan conducted a security boarding on the F/V Badger. While underway from Muskegon MI to Milwaukee WI. Loading and unloading of passengers and vehicles where observed. No discrepancies or deficiencies were noted.

14. Activity #/ 2727390 Orig Port/ SFO GrndHvn Owner Port/ SFO GrndHvn Start Dt/ 28Jul2006
Role Type/ Subject to Marine Inspection Activity Type/ Vessel Inspection/PSC
Activity Subtypes/ DEFICIENCY CK
Status/ Closed - Agency Action Complete Date Status Last Changed/ 19Apr2007
Notes (Truncated)/ Conducted a deficiency check of the M/V BADGER. 01 deficiency cleared, 00 deficiencies issued, 00 remain outstanding.

15. Activity #/ 2732525 Orig Port/ MSU Chicago Owner Port/ MSU Chicago Start Dt/ 24Jul2006
Role Type/ Subject to Marine Inspection Activity Type/ Vessel Inspection/PSC
Activity Subtypes/ REINSPECTION
Status/ Closed - Approved Inspection Date Status Last Changed/ 01Aug2006
Notes (Truncated)/ 24JUL2006-Attended vessel in company of Chief Engineer Chuck Cart and Capt. Dean Hobbs to conduct 1st quarterly re-inspection for certification using applicable regulations and CG-840 books. Vessels initial COI was done in April although of COI issue date is June. Vessel was moored in her berth in Ludington, MI. Examined ssel logs and training records. Did not conduct fire drill due to ti

. Activity #/ 2738743 Orig Port/ STA TwoRvrs Owner Port/ STA TwoRvrs Start Dt/ 20Jul2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Status/ Closed - Agency Action Complete Date Status Last Changed/ 07Aug2006
Notes (Truncated)/ no violations

17. Activity #/ 2718916 Orig Port/ STA TwoRvrs Owner Port/ STA TwoRvrs Start Dt/ 15Jul2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Activity Subtypes/
Status/ Closed - Agency Action Complete Date Status Last Changed/ 20Jul2006
Notes (Truncated)/ NO VIOLATIONS

18. Activity #/ 2718907 Orig Port/ STA TwoRvrs Owner Port/ STA TwoRvrs Start Dt/ 15Jul2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Activity Subtypes/
Status/ Closed - Agency Action Complete Date Status Last Changed/ 20Jul2006
Notes (Truncated)/ NO VIOLATIONS

19. Activity #/ 2710320 Orig Port/ STA TwoRvrs Owner Port/ STA TwoRvrs Start Dt/ 11Jul2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Status/ Closed - Agency Action Complete Date Status Last Changed/ 12Jul2006
Notes (Truncated)/

20. Activity #/ 2710310 Orig Port/ STA TwoRvrs Owner Port/ STA TwoRvrs Start Dt/ 11Jul2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Status/ Closed - Agency Action Complete Date Status Last Changed/ 12Jul2006
Notes (Truncated)/

21. Activity #/ 2738735 Orig Port/ STA TwoRvrs Owner Port/ STA TwoRvrs Start Dt/ 07Jul2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Status/ Closed - Agency Action Complete Date Status Last Changed/ 07Aug2006
Notes (Truncated)/ no violations

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22. Activity #/ 2724018 Orig Port/ SEC LkMichgn Owner Port/ SEC LkMichgn Start Dt/ 20Jun2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Activity Subtypes/ SIV
Status/ Closed - Agency Action Complete Date Status Last Changed/ 25Jul2006
Notes (Truncated)/ On 08June06 1800 Sector Lake Michigan/Sta. Ludington conducted a security boarding on the F/V Badger. Boarding was conducted underway while the vessel was in route to Ludington MI. During the boarding passenger embarkation and dembarkation was observed. No suspicious activites were noted. No discrepincies.

23. Activity #/ 2724001 Orig Port/ SEC LkMichgn Owner Port/ SEC LkMichgn Start Dt/ 20Jun2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Activity Subtypes/
Status/ Closed - Agency Action Complete Date Status Last Changed/ 25Jul2006
Notes (Truncated)/ On 20June06 1230 Sector Lake Michigan/Sta Ludington conducted a security boarding on the F/VBager. Boarding was conducted underway while the vessel was in route to Manitowoc. During the boarding passenger embarkation and dembarkation was observed. No suspicious activites were noted. No discrepincies.

24. Activity #/ 2684726 Orig Port/ STA TwoRvrs Owner Port/ STA TwoRvrs Start Dt/ 19Jun2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Status/ Closed - Agency Action Complete Date Status Last Changed/ 19Jun2006
Notes (Truncated)/

25. Activity #/ 2684721 Orig Port/ STA TwoRvrs Owner Port/ STA TwoRvrs Start Dt/ 19Jun2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Status/ Closed - Agency Action Complete Date Status Last Changed/ 19Jun2006
Notes (Truncated)/

26. Activity #/ 2684689 Orig Port/ STA TwoRvrs Owner Port/ STA TwoRvrs Start Dt/ 17Jun2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Status/ Closed - Agency Action Complete Date Status Last Changed/ 19Jun2006
Notes (Truncated)/

27. Activity #/ 2684672 Orig Port/ STA TwoRvrs Owner Port/ STA TwoRvrs Start Dt/ 17Jun2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Status/ Closed - Agency Action Complete Date Status Last Changed/ 19Jun2006
Notes (Truncated)/

28. Activity #/ 2668256 Orig Port/ SEC LkMichgn Owner Port/ SEC LkMichgn Start Dt/ 30May2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Activity Subtypes/
Status/ Closed - Agency Action Complete Date Status Last Changed/ 02Jun2006
Notes (Truncated)/ 30 May 06 -Sector Lake Michigan Conducted a random security boarding on the F/V Badger. Boarding was conducted while the vessel was under way from Ludington MI to Manitowoc WI. Security of the vessel was verified and no suspecious activites were identified. Loading and unloading of passengers and cargo was observed. Boarding complete.

29. Activity #/ 2668244 Orig Port/ SEC LkMichgn Owner Port/ SEC LkMichgn Start Dt/ 29May2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Activity Subtypes/
Status/ Closed - Agency Action Complete Date Status Last Changed/ 02Jun2006
Notes (Truncated)/ 29 May 06 -Sector Lake Michigan Conducted a random security boarding on the F/V Badger. Boarding was conducted while the vessel was under way from Manitowoc WI to Ludington MI. Security of the vessel was verified and no suspecious activites were identified. Loading and unloading of passengers and cargo was observed. Boarding complete.

30. Activity #/ 2659030 Orig Port/ STA TwoRvrs Owner Port/ STA TwoRvrs Start Dt/ 25May2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Status/ Closed - Agency Action Complete Date Status Last Changed/ 25May2006
Notes (Truncated)/ vsl had no violations

31. Activity #/ 2659028 Orig Port/ STA TwoRvrs Owner Port/ STA TwoRvrs Start Dt/ 25May2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Status/ Closed - Agency Action Complete Date Status Last Changed/ 25May2006

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Notes (Truncated)/ vsl had no violations

32. Activity #/ 2657958 Orig Port/ STA TwoRvrs Owner Port/ STA TwoRvrs Start Dt/ 15May2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Status/ Closed - Agency Action Complete Date Status Last Changed/ 24May2006
Notes (Truncated)/ vsl had no violation

33. Activity #/ 2657966 Orig Port/ STA TwoRvrs Owner Port/ STA TwoRvrs Start Dt/ 14May2006
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Status/ Closed - Agency Action Complete Date Status Last Changed/ 24May2006
Notes (Truncated)/ vsl had no violations

34. Activity #/ 2624223 Orig Port/ MSD GrndHvn Owner Port/ SFO GrndHvn Start Dt/ 09May2006
Role Type/ Subject to Marine Inspection Activity Type/ Vessel Inspection/PSC
Activity Subtypes/ CERTIFICATION and MTSA VER
Status/ Closed - Approved Inspection Date Status Last Changed/ 30May2006
Notes (Truncated)/ 13Apr: Met with vsl captain, Dean Hobbs, and first mate, Mike Martin to discuss upcoming COI. Set up dates in May to conduct deck side of the COI. CWO Jeff Carie (MSU Chicago) will lead engineering inspection and will coordinate with chief engineer, Chuck Cart. Vessel moored starboard side to at Lake Michigan Carferry facility in Ludington, MI. Began COI with fire hose check. Vsl's 27 fire

35. Activity #/ 2583042 Orig Port/ MSU Chicago Owner Port/ MSU Chicago Start Dt/ 07Feb2006
Role Type/ Subject to Marine Inspection Activity Type/ Vessel Inspection/PSC
Activity Subtypes/ REPAIRS
Status/ Closed - Approved Inspection Date Status Last Changed/ 10Feb2006
Notes (Truncated)/ 07FEB2006- Attended vessel layed up at her birth in Ludington, Michigan in company of Chief Engineer Chuck Cart. Examined ongoing repairs (retube of Gen tubes) of the port forward boiler. Examined 10' by 12" insert made in WTB 79 centerline at the bilge. Examined ongoing repairs to the starboard side frame gussets in the boilerroom. Examined ongoing repairs to the horizonal runs of the firemai

36. Activity #/ 2506554 Orig Port/ SEC LkMichgn Owner Port/ SEC LkMichgn Start Dt/ 28Sep2005
Role Type/ Subject to Marine Inspection Activity Type/ Boarding
Activity Subtypes/
Status/ Closed - Agency Action Complete Date Status Last Changed/ 04Apr2006
Notes (Truncated)/ Members rode ferry across lake as a random PCM.

37. Activity #/ 1950215 Orig Port/ CG MSC Owner Port/ CG MSC Start Dt/ 24Oct2003
Role Type/ Subject to Marine Inspection Activity Type/ Vessel Inspection/PSC
Activity Subtypes/
Status/ Closed - Security Plan Approved by MSC Date Status Last Changed/ 25Jan2006
Notes (Truncated)/

38. Activity #/ 1690539 Orig Port/ MSD GrndHvn Owner Port/ COMDT 385 Start Dt/ 16Oct2002
Role Type/ Involved in a Marine Investigation (non-casualty) Activity Type/ Incident Investigation
Status/ Closed - Agency Action Complete Date Status Last Changed/ 29Sep2006
Notes (Truncated)/

---Hazardous Cargo Authority---

Vessel is NOT Authorized to carry Hazardous Cargo

---Special Notes---

1. Activity #/ 2970215 Last Revised/ 22Jun2007 Unit/ MSU Chicago
Description/ Under current regulations, Vessel may discharge ASH in the waters of the Great Lakes under Title 40, Code of Federal Regulations part 122.3. ****SEE MISLE ACTIVITY 2970215 AND SUPPORTING DOCUMENTS FOR DETAILS****

2. Activity #/ 2936943 Last Revised/ 22May2007 Unit/ CG MSC

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Description/ BADGER has been added to the VSP Received security plan.

3. Activity #/ Last Revised/ 04Dec2006 Unit/ MSU Chicago
Description/ DUE TO DESIGN OF MAIN STEAM STOP VALVES, WHICH ARE STAMPED AS 400 POUND ALVES BUT RATED TO 500, BOILERS MAY NOT BE OPERATED ABOVE 700 DEG F. STEAM TEMP. See MISLE Activity number 2825387 for details.
4. Activity #/ Last Revised/ 12Jun2006 Unit/ SEC LkMichgn
Description/ S/S BADGER discharges flyash during each transit. Occasionally, this is reported as pollution. The flyash is the byproduct of burning coal and has been deemed non-hazardous. Per 40CFR122.3, no EPA permit is required to dump effluent from a properly running engine.
5. Activity #/ 2624223 Last Revised/ 04May2006 Unit/ MSU Chicago
Description/ Vessel requires cold and hot plant inspections to test all safeties each spring.
6. Activity #/ 2502454 Last Revised/ 05Oct2005 Unit/ MSU Chicago
Description/ Check all smoke detectors in passenger berths at each attendance for tampering and proper operation. Detectors have been found inoperative on multiple visits. If problem presists, Require hard wiring of detectors to mitigate problem.
7. Activity #/ Last Revised/ 23Jun2004 Unit/ MSD GrndHvn
Description/ Vsl lifeboats shall contain each of the following equip (46 CFR 199.620(j)): 1 bailer, 1 boat hook, 1 bucket, 6 handheld flares, 4 parachute flares, 1 flashlight, 2 hatchets, oars, 2 painters, 1 sea anchor, & 1 lifeline. The following exemption applies due to the construction design of the lifeboats (non-motorized): fire extinquisher, ladder, searchlight, survival instructions, & tool kit.

---Outstanding Deficiencies---

1. Activity #/ 2937021 Issue Date/ 15May2007 Issue Port/ MSU Chicago
Resolution/ To the satisfaction of the attending Coast Guard Marine Inspector Due/ 04/01/2008
System/ Engineering Subsystem/
Condition/ Bursted
Deficiency Cause/ Damaged By Earlier Event
Deficiency Description/ Effect repairs to the continous blowdown valve on the after port boiler valve to the satisfaction of the attending marine inspector.
2. Activity #/ 2909379 Issue Date/ 09May2007 Issue Port/ MSU Chicago
Resolution/ To the satisfaction of the attending Coast Guard Marine Inspector Due/ 06/10/2007
System/ Engineering Subsystem/
Condition/
Deficiency Cause/
Deficiency Description/ Repair or replace diesel line cut-off valve in overhead for the emergency generator.
3. Activity #/ 2909379 Issue Date/ 09May2007 Issue Port/ MSU Chicago
Resolution/ To the satisfaction of the attending Coast Guard Marine Inspector Due/ 06/10/2007
System/ Fire Fighting Subsystem/
Condition/
Deficiency Cause/
Deficiency Description/ Replace The cover for Fire Station #2.
4. Activity #/ 2909379 Issue Date/ 09May2007 Issue Port/ MSU Chicago
Resolution/ To the satisfaction of the attending Coast Guard Marine Inspector Due/ 06/10/2007
System/ Lifesaving Subsystem/
Condition/
Deficiency Cause/
Deficiency Description/ Repair #1 lifeboat port handrail.
5. Activity #/ 2909379 Issue Date/ 09May2007 Issue Port/ MSU Chicago
Resolution/ To the satisfaction of the attending Coast Guard Marine Inspector Due/ 06/10/2007
System/ Accommodation/Occupational Safety Subsystem/
Condition/

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Deficiency Cause/
Deficiency Description/ Replace stbd ladder ivo of lifeboat #5 platform.
Activity #/ 2909379 Issue Date/ 09May2007 Issue Port/ MSU Chicago
Resolution/ To the satisfaction of the attending Coast Guard Marine Inspector Due/ 06/10/2007
System/ Fire Fighting Subsystem/
Condition/
Deficiency Cause/ Unknown
Deficiency Description/ Effect perminent repairs in way of the Starboard Boat deck Pipe Chase.

---Marine Violation Summary---

---Casualty Summary---

Since/ 17Jul2002

1. Activity #/ 2937191 Port/ SFO GrndHvn Start Date/ 15May2007
   Location/
2. Activity #/ 2833663 Port/ SEC LkMichgn Start Date/ 22Sep2006
   Location/
3. Activity #/ 2786900 Port/ SEC LkMichgn Start Date/ 11Sep2006
   Location/

END

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HOFFMAN COMBUSTION ENGINEERING COMPANY
INDUSTRIAL STOKERS
GENERAL OFFICES - MARQUETTE BUILDING
DETROIT 26, MICHIGAN

August 16, 1951

CHESAPEAKE AND OHIO RY. CO.
OFFICE OF SUPT. S. S.
AUG 17 1951
FILE

Induced draft fans

C & O Railway Company
Ludington, Michigan

Attention: Mr. L. H. Kent,
Superintendent of Steamships

RE: Check Figures on Induced Draft Fans
For New Car Ferries Under Construction
In Sturgeon Bay, Wisconsin

Gentlemen:

In accordance with our discussion regarding checking capacity of the induced draft fans for the two new car ferries, based upon past experience and particularly with a view to designing for minimum smoke when steaming from the dock and maneuvering, we checked the figures obtained from you, which were the basis of ordering the induced draft fans. These figures copied from your data were as follows:

# Steam per hr.	30,000	44,000	Design
# Gas per hr.	52,400	72,000	85,400
Temperature, Deg. F.	340	390	410
Collector Resistance	2.16	4.33	——
Total Draft Loss	3.21	6.63	8.25
B.H.P.	12.92	39.0	61.4
R.P.M.	764	1130	1300

Using our method of calculation wherein we suggest an increase in capacity equivalent to a minimum of 1/2% CO_2 loss due to infiltration, and an extra capacity to handle the high pressure over-fire air used at its maximum rate when maneuvering, etc., and adding 20% excess to the actual operating requirement to compensate for possible coal feed machine stoppage, wet fuel and quick surge of steam requirement and also based on 12% CO_2, the following figures result.

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28. SMOKE INDICATORS - Not furnished

Make Type

Number per boiler

29. FEED WATER REGULATORS

Make Swartwout type Thermohydraulic

2 Shutoff valves, size ½ ", type Edwards 444 or equal

1 Drain valve, size 3/8 ", type Edwards 444 or equal

30. FANS

a) Forced Draft not Furnished

The air requirements for each generator are as follows:

Capacity, 15,800 Cfm at 100°F for 44,000 lb. per hour evaporation, against 2.5 " water head.

Above Cfm and inches water head include factors of 1.15 and 1.32 respectively

Make	Type			HP	RPM
Motor Drive	Volts	Cycles	Phase	HP motor	
Make	Type				
Turbine Drive	lb.	deg. F supply		lb. exhaust	
Make	Type				
Water rate each		lbs. per hour		HP	RPM

b) Induced Draft not Furnished

The air requirements for each generator are as follows:

Capacity, 25,300 Cfm at 380 °F for 44,000 lb. per hour evaporation, against 2.0 " water head.

Above Cfm and inches water head include factors of 1.15 and 1.32 respectively

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ERH ELECTRONICS
1350 E. CONRAD ROAD
SCOTTVILLE, MI. 49454
(616) 757-1350

January 26, 1993

LAKE MICHIGAN CARFERRY SERVICE, INC.
P.O. Box 708
Ludington, Michigan 49431

Attention: Jim Anderson

Subject: S.S. BADGER Combustion Control Upgrade

Dear Jim:

After reviewing the Johnson Yokogawa Corporation (JYC) proposal for upgrading the combustion control system aboard the Badger, I recommend a phased approach to the upgrade project. It is my opinion that replacement of the combustion control in sections is feasible from an engineering standpoint and will provide some obvious economic advantages as well. For example, replacing just the Master Control section will greatly improve the performance and combustion efficiency of the boilers as well as eliminating many of the maintenance problems we have experienced in the past.

ERH Electronics will be able to provide any custom interface needed to connect new sections with the existing control system. I look forward to meeting with you soon to discuss the implementation of this approach.

Sincerely,

Edward R. Hallin

cc C. Thomsen

EDWARD R. HALLIN
CONSULTANT

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JOHNSON YOKOGAWA

Johnson Yokogawa Corporation
1050 State Route 83 North
Suite 150
Bensenville, Illinois 60106-1000
Tel. 708/238-5000
FAX: 708/238-5005

March 3, 1993 JYC #222006-1

LAKE MICHIGAN CARFERRY SERVICE, INC.
P. O. Box 708
Ludington, MI 49431

Attention: Mr. James E. Anderson

Subject: S.S. BADGER

Dear Mr. Anderson:

The following material has been sent to Mr. Thomsen at the Marine Shop:

YS170 Controller
YA43 Pressure Transmitter
YSS10 Configuration Software

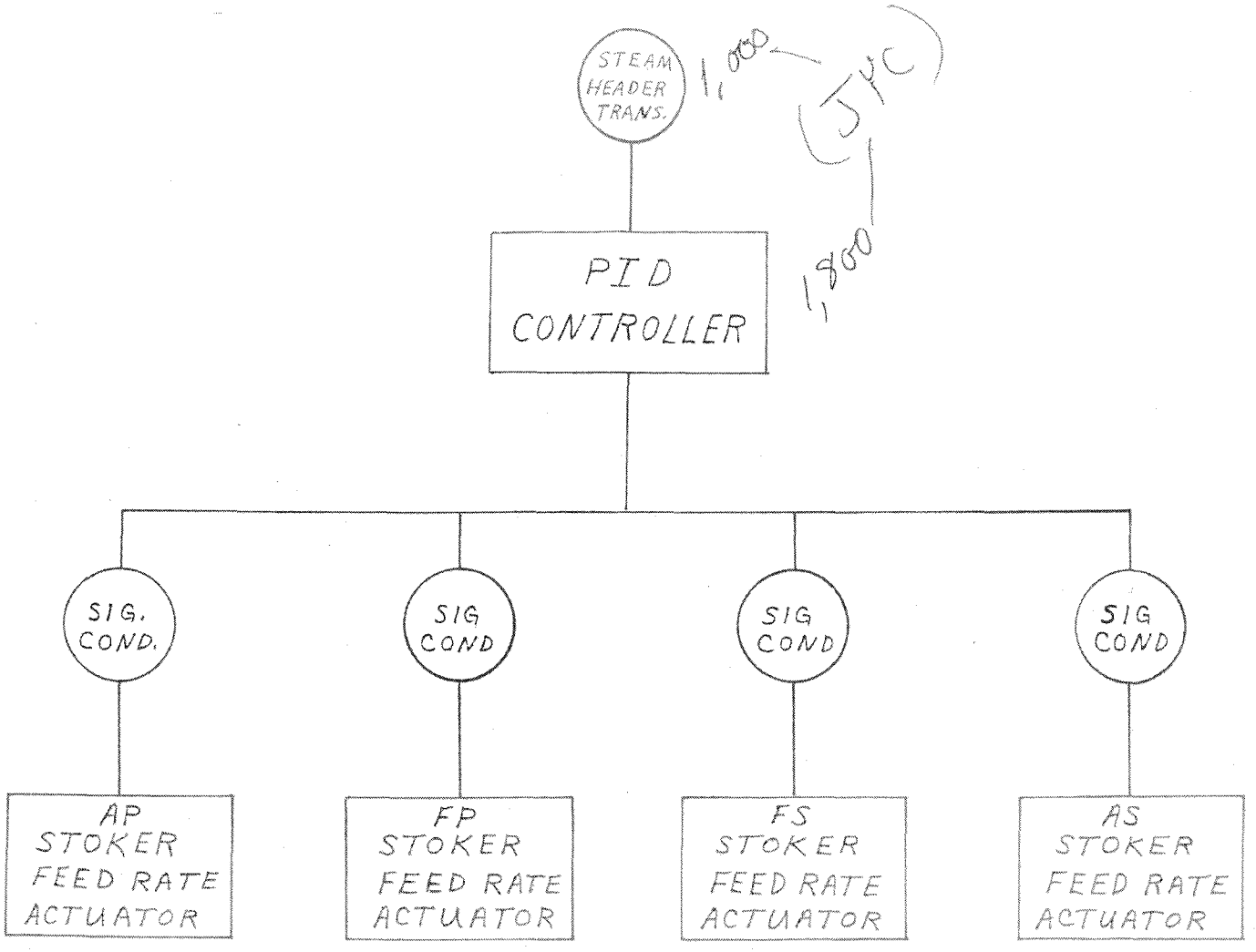
Instruction Manuals and a wiring diagram for Mr. Hallin's use have also been sent along. Please feel free to contact me should you or Ed Hallin have any questions.

Best Regards,

JOHNSON YOKOGAWA CORPORATION

Wally A. Henkel

cc: Steve Ostrowski
Mike Farrow



LAKE MICHIGAN CARFERRY SERVICE

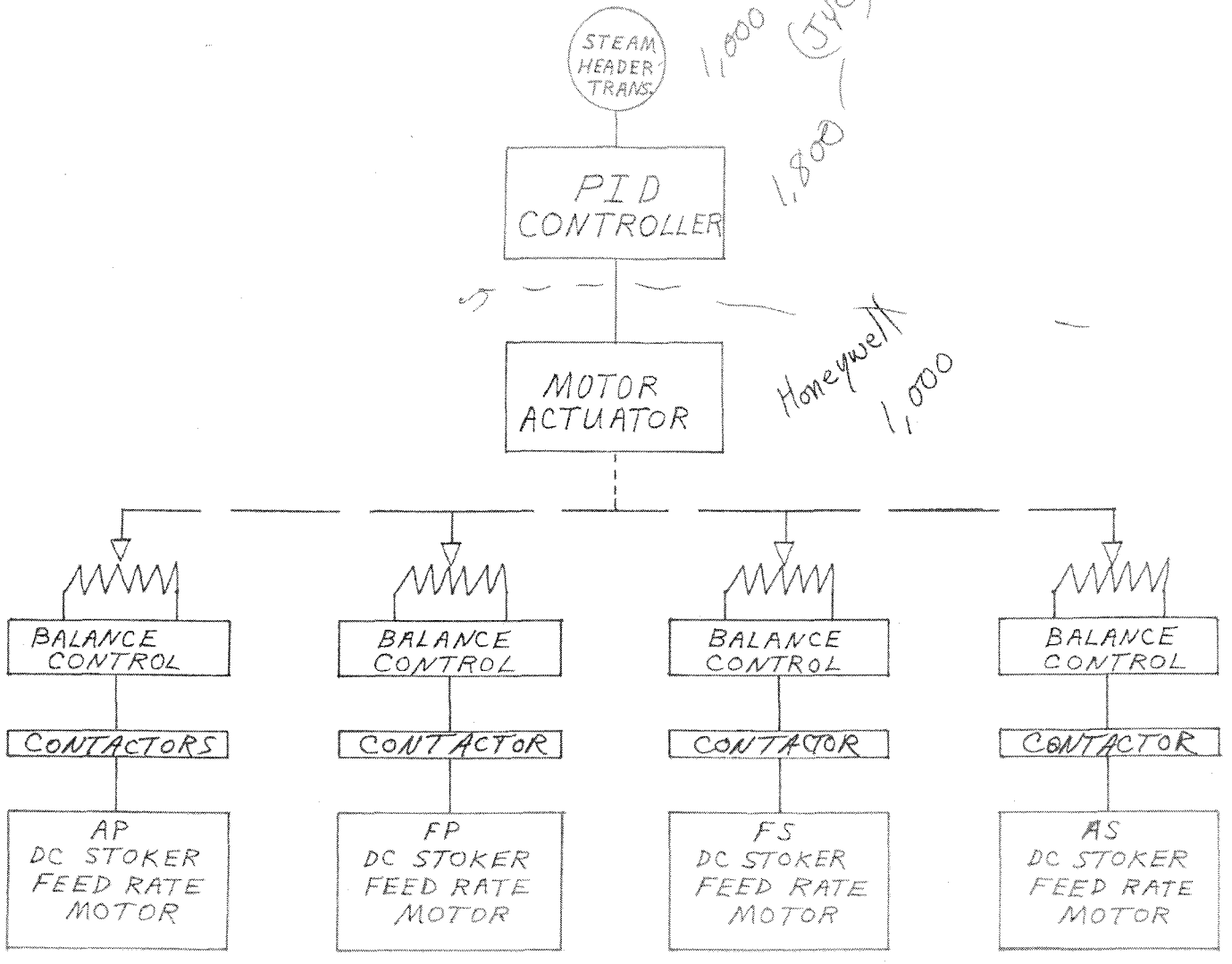
S.S. BADGER

COMBUSTION CONTROL SYSTEM UPGRADE

ALTERNATE NO.: 1

ERH ELECTRONICS
JANUARY 28, 1993

LMCF00198



LAKE MICHIGAN CARFERRY SERVICE

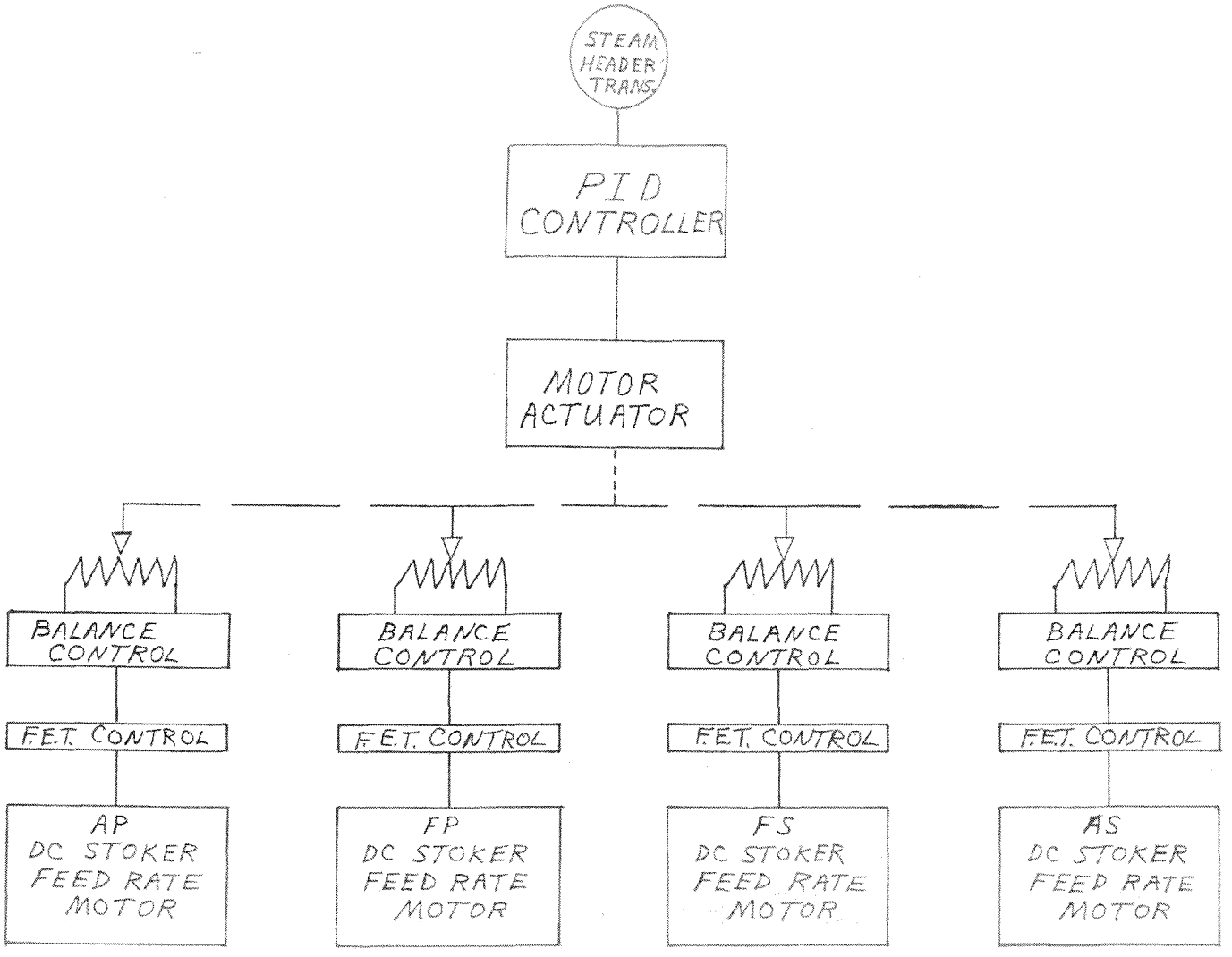
S.S. BADGER

COMBUSTION CONTROL SYSTEM UPGRADE

ALTERNATE NO. - 2

ERH ELECTRONICS
JANUARY 28, 1993

LMCF06199



LAKE MICHIGAN CARFERRY SERVICE

S.S. BADGER

COMBUSTION CONTROL SYSTEM UPGRADE

ALTERNATE NO.: 3

ERH ELECTRONICS
JANUARY 28, 1993

LMCF00200

LAKE MICHIGAN CARFERRY

DATE: January 8, 1993

TO: Charles Conrad

FROM: Jim Anderson

RE: Johnson Yokogawa Quote-
Boiler and Stoker Controls

Enclosed is a revised Johnson Controls quote. This new quote is the result of a visit by one of their engineers (see attached).

This new price is based on a closer look at the boat and is about CBI less than the original. However, we would need to purchase (12) new electric actuators to replace the existing DC motor drives on each stoker, FD fan inlet vane and boiler outlet damper. This would cost an additional

CBI

This project is something we probably can't afford to do this year but it should be considered for the following season.

Jim C

LMCF00201

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JOHNSON YOKOGAWA

Johnson Yokogawa Corporation
Suite 302
650 West Grand Avenue
Elmhurst, IL 60126-1017
Tel. 708/941-0009
FAX: 708/941-0049

January 6, 1993

LAKE MICHIGAN CARFERRY SERVICE, INC.
P. O. Box 708
Ludington, MI 49431

Attention: Mr. James E. Anderson

Subject: S.S. BADGER Boiler Control Survey

Dear Mr. Anderson:

Thank you for allowing me to use the various LMCS resources made available on December 17 and 18 as well as the time you spent speaking with me. We now have a clearer understanding of your needs and can more appropriately address them.

Based on discussions with Carol Thomsen, Steve Morong, and Robert Roach, as well as information obtained during Albert Dillen's trip aboard the S.S. BADGER on October 2nd, major problems associated with the S.S. BADGER's boilers are: unstable main header pressure during docking and maneuvering; excessive smoking and poor air/fuel ratio control; poor furnace pressure control with frequent positive pressure variances.

The causes of these problems are attributable to:

The condition of the obsolete General Regulator DC motor drives and reversing starters;

The existing control system, which being based on forty-year old technology is very cumbersome to tune and does not allow for even the simplest of functionality such as variable header pressure setpoint operation;

The fact that the existing control system, even with all its inherent limitations, is not being operated as designed.

The thirteen DC motor drives which move the master demand potentiometers, the FD Fan inlet vanes, the stokers, and the boiler outlet dampers, along with their associated control circuitry have seen better days. There is excessive play in positioning these drives, and it was mentioned that the coils on the reversing starters frequently stick, causing the drive motors to over-travel

and to damage or destroy the associated drive linkages. In the case of the FD Fan inlet vane drives, it is my understanding that they are not allowed to modulate at all, being set fully open except while docking. These problems must be eliminated in order to regain satisfactory combustion control.

Specific recommendations to eliminate these problems are:

1) Replace the existing DC motor drives and reversing starters with twelve new pneumatic or electric control drives (one for each stoker, FD Fan inlet vane, and boiler outlet damper).

2) Install new Air Flow, Furnace Pressure, and Main Steam Header Pressure and, optionally, Steam Flow Transmitters.

3) Replace the Air Flow, Stoker, and Furnace Pressure portions of the existing combustion control system with Johnson Yokogawa YS170 Controllers. (Please refer to the attached SAMA Diagrams and disregard the Control Diagrams provided with the previous proposal.)

There is no urgent need (presently) to modify the drum level/feedwater controls, modify the ID Turbine speed controls, or add O_2 trim. These will not help eliminate the problems described earlier. There are other reasons as well, for example, while the Thermo-Hydraulic Feedwater Regulators are obsolete, Steve and Robert indicate that they work fine, and Carol thinks that there are spare parts available from units removed during the MIDLAND 41 control system retrofit.

In the case of ID Fan turbines and the associated speed controls, the original steam flow control valves have long since been removed, and it would be quite expensive to install new ones. Further, provided that the boiler outlet dampers are in decent shape (meaning that they are not broken, frozen, or excessively sloppy), we should have no problem controlling furnace pressure by establishing a baseline manually set turbine speed for each ID Fan and then modulating the boiler outlet dampers.

As far as adding O_2 trim, a properly set-up O_2 trim system can improve boiler efficiency a few percent above a correctly

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functioning non-O_2 trimming control system. How much efficiency improvement is available depends on numerous factors including the type and quality of fuel, the type and condition of the boiler, the frequency and severity of load changes. etc. The cost of adding O_2 trim (in round figures about CBI per boiler not including installation costs) must be weighed against the improvement in boiler efficiency gained.

Any of these can be incorporated in future upgrade projects, and may be something to consider after a season of operation with, and evaluation of, the new control system.

Two copies of a Base Proposal to improve the S.S. BADGER's Boiler Controls along with optional pricing to add Steam Flow Measurement to increase the performance of the Base System are enclosed. Also enclosed are a System Summary, an Implementation Activity Summary, a discussion of the Impacts of Steam Flow Measurement, SAMA Control Diagrams and descriptions for the Base and Optional Systems, quotations from Control Drive manufacturers, and some miscellaneous material.

We can have the equipment we are proposing to supply ready for delivery and installation within six weeks after receipt of Purchase Order. Please note however, Control Drives are typically fairly long lead time items (between 10 and 20 weeks), and if a control system upgrade project is to be completed this spring, a decision to proceed must be made fairly quickly.

Thank you again for meeting with me in Ludington and please feel free to contact me should you have any questions.

Best Regards,

JOHNSON YOKOGAWA CORPORATION

Wally A. Henkel

Wally A. Henkel

cc: Al Dillen
Mike Farrow
Jim Lowe
Steve Ostrowski
Steve Venditti

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Johnson Yokogawa Corporation

BASE SYSTEM

The proposed Base System is a single element Plant Master with direct positioning stoker controls. The Optional System is a more sophisticated Target Steam Flow Plant Master with Steam Flow/Air Flow stoker controls. This system uses Steam Flow as an inferential fuel flow measurement allowing tighter Air/Fuel ratio control as well as a more responsive Plant Master. Please refer to Drawing LMCS-02 for details about the Base Control System and LMCS-03 for details about the optional system.

One Panel Insert for the Port Boiler Control Panel completely assembled and wired:	CBI
One Panel Insert for the Starboard Boiler Control Panel completely assembled and wired (the Port Panel insert is more expensive because it has an extra controller and four signal isolators not contained in the Starboard Panel):	CBI
13 YS170 Controllers:	
One YA43 Header Pressure Transmitter:	CBI
Four YA11 Air Flow Transmitters:	CBI
Four YA11 Furnace Pressure Transmitters:	
Engineering, which includes all programming, drawings, progress meetings, installation supervision assistance, instrument calibration, start-up (not to exceed 80 hours), and 40 hours of operator training:	CBI
Support activities (Project Management and Clerical assistance):	CBI
Travel & Living Expenses (for all meetings, installation supervision assistance, start-up, training, etc.):	CBI
Miscellaneous (Warranty, Freight, Taxes, and Supplies):	CBI
TOTAL	CBI

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OPTIONAL SYSTEM

The Optional System includes all of the equipment and labor contained in the Base System plus the following:

Base System Price:	CBI
Four YF110 Vortex Shedding Steam Flow Transmitters	
600 Lb Class Flanges: or 300 Lb Class Flanges:	CBI
Additional Warranty & Miscellaneous:	CBI
Additional Engineering:	
TOTAL (using 600 Lb Flanges): or **TOTAL** (using 300 Lb Flanges):	CBI

Please refer to the Implementation Activity Summary which follows. The above prices are based on the separation of responsibilities for project activities as described.

These prices are good for 120 days and are subject to Johnson Yokogawa Corporation's Terms and Conditions a copy of which follows.

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SYSTEM SUMMARY

The existing Boiler Control Panels will be modified to accommodate Panel Inserts which contain the YS170 Controllers. These Inserts include clear hinged covers to protect the front of the controllers. A Plant Master Controller and a Controller for each stoker, boiler outlet damper, and FD Fan inlet vane will be provided. This Proposal assumes the Plant Master Controller will be installed in the Port Control Panel Insert, but can easily be installed in the Starboard Panel if desired. The fresh air supply ducts which discharge above existing Control Panels will be undisturbed and the Draft Gages will remain intact. Modifying and reusing the existing enclosures as described above is much less costly than installing new enclosures.

The existing DC motor drives will be replaced by new electric or pneumatic Control Drives. Using pneumatic drives would require the installation of an air compressor and air drying equipment.

Air Flow, Furnace Pressure, Main Steam Header Pressure and, optionally, Steam Flow transmitters will be installed.

The YS170 Controllers will receive signals from these transmitters and position the Control Drives as shown on Drawing LMCS-02 (or LMCS-03).

As mentioned previously, the Panel Inserts will be provided with clear hinged covers to protect the controller faceplates from the Boiler Room environment. In order to further protect the controllers from the coal dust present in the Boiler Room, LMCS might consider pressurizing the Control Panels with filtered air (possibly form the fresh air ducts). Doing so would maximize the controllers' lives and help ensure trouble free operation.

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Johnson Yokogawa Corporation

IMPLEMENTATION ACTIVITY SUMMARY

The existing DC motor drives will be replaced with new Control Drives, purchased and installed by LMCS. Four Air Flow, four Furnace Pressure, one Main Steam Header Pressure and, optionally, four Steam Flow Transmitters will be supplied by JYC and installed by LMCS. The optional Steam Flow transmitters will require some piping rework which is discussed later. Panel Inserts which contain the YS170 Controllers will be provided by JYC. LMCS will cut-out sections of the existing Control Panels and install the new Panel Inserts. If LMCS decides to pressurize the Control Panels with clean air, this will be LMCS's responsibility. LMCS will provide 120 VAC power to the Panel Inserts and to the Control Drives and complete the field wiring between Transmitters, Control Drives, and the Panel Inserts. (This assumes electric Control Drives will be used, if not, clean dry compressed air at approximately 100 psig must be supplied to the pneumatic drives in lieu of 120 VAC power.) Some mechanical modifications to the existing drive linkages may be required to allow proper connection to the new drives. If required, these modifications will be done by LMCS. System engineering, controller programming, instrument calibration, stroking and set-up of control drives, system start-up, and 40 hours operator training will be provided by JYC. The following drawings will be provided by JYC and updated to reflect any changes made during start-up: Panel cut-out, Panel Insert layout, Panel Insert Installation/Mounting, Panel Insert internal wiring, field device installation details, and SAMA control logic. O&M manuals for all JYC supplied equipment will be furnished by JYC. Any licenses or permits required to complete this project will be secured by LMCS.

IMPACTS OF STEAM FLOW MEASUREMENT

Presently, The Boiler Controls aboard the S. S. BADGER don't meter Steam Flow. We recommend adding Steam Flow measurement for the following reasons:

1) Steam Flow can be used as an inferential measurement of coal flow. With an approximation of fuel flow available, better Coal/Air ratio control is possible which results in better boiler efficiency. Without Steam Flow measurement, we are forced to use a relatively simple parallel positioning method of control.

2) Having Steam Flow available allows use of a more sophisticated and responsive Target Steam Flow Plant Master rather than a single element Plant Master.

3) Presently, the boiler operators have very little information available about how the boilers are operating. Having Steam Flow for each unit available gives valuable insight to the condition of the boilers and may help influence decisions such as which boilers to run or how often to blow soot.

4) Certain future upgrades, such as replacing the existing Drum Level controls, will be made more effective by having Steam Flow available.

Of course, these benefits aren't free. In the case of the S.S. BADGER there are also complications caused by the confined piping arrangements, with very short runs of straight steam pipe on the aft boilers. In order to measure Steam Flow at all on the aft boilers, some type of Steam Flow straightening equipment, or piping reconfiguration is required.

The simplest and least expensive approach would be to use a 4 inch Vortex Shedding Flow Meter with concentric 6" to 4" reducers and expanders. These transmitters require 10 pipe diameters of straight pipe upstream and 5 diameters downstream. In essence, the installation of an approximately 7' spool piece with an inline transmitter is required on the aft boiler steam headers. Although there are long straight runs of pipe on the forward boilers, the same approach as used on the aft units should be used for simplicity and consistency.

Issues to keep in mind while assessing the desirability of adding Steam Flow Measurement as described above are: Asbestos removal from the existing piping; the need to Hydro-test the installation; the fact that the piping configuration described above will impose an unrecoverable steam pressure loss of approximately 9.3 psig at maximum flow.

TERMS AND CONDITIONS

By accepting this proposal, Purchaser agrees to be bound by the following terms and conditions:

1. **SCOPE OF WORK.** This proposal is based upon the use of straight time labor only. Plastering, patching and painting are excluded. "In-line" duct and piping devices, including, but not limited to, valves, dampers, humidifiers, wells, taps, flow meters, orifices, etc., if required hereunder to be furnished by Johnson Yokogawa, shall be distributed and installed by others under Johnson Yokogawa's supervision but at no additional cost to Johnson Yokogawa. Purchaser agrees to provide Johnson Yokogawa with required field utilities (electricity, toilets, drinking water, project hoist, elevator service, etc.) without charge. Johnson Yokogawa agrees to keep the job site clean of debris arising out of its own operations. Purchaser shall not back charge Johnson Yokogawa for any costs or expenses without Johnson Yokogawa's written consent.

   Unless specifically noted in the statement of the scope of work or services undertaken by JYC under this agreement, JYC's obligations under this agreement expressly exclude any work or service of any nature associated or connected with the identification, abatement, clean up, control, removal, or disposal of environment Hazards or dangerous substances, to include but not be limited to asbestos or PCBs, discovered in or on the premises. Any language or provision of the agreement elsewhere contained which may authorize or empower the Purchaser to change, modify, or alter the scope of work or services to be performed by JYC shall not operate to compel JYC to perform any work relating to Hazards without JYC's express written consent.

2. **INVOICING & PAYMENTS.** Johnson Yokogawa may invoice Purchaser monthly for all materials delivered to the job site or to an off-site storage facility and for all work performed on-site and off-site. Purchaser shall pay Johnson Yokogawa at the time purchaser signs this agreement **an advance payment equal to 10% of the contract price,** which advance payment shall be credited against the final payment (but not any progress payment) due hereunder and purchaser agrees to pay Johnson Yokogawa additional amounts invoiced upon receipt of the invoice. Waivers of lien will be furnished upon request, as the work progresses, to the extent payments are received. If Johnson Yokogawa's invoice is not paid within 30 days of its issuance, it is delinquent.

3. **MATERIALS.** If the materials or equipment included in this proposal become temporarily or permanently unavailable for reasons beyond the control and without the fault of Johnson Yokogawa, then in the case of such temporary unavailability, the time for performance of the work shall be extended to the extent thereof, and in the case of permanent unavailability, Johnson Yokogawa shall (a) be excused from furnishing said materials or equipment, and (b) be reimbursed for the difference between the cost of the materials or equipment permanently unavailable and the cost of a reasonably available substitute therefor.

4. **WARRANTY.** Johnson Yokogawa warrants that the equipment manufactured by it shall be free from defects in material and workmanship arising from normal usage for a period of one (1) year from delivery of said equipment, or if installed by Johnson Yokogawa, for a period of one (1) year from installation. Johnson Yokogawa warrants that for equipment furnished and/or installed but not manufactured by Johnson Yokogawa, Johnson Yokogawa will extend the same warranty terms and conditions which Johnson Yokogawa receives from the manufacturer of said equipment. For equipment installed by Johnson Yokogawa, if Purchaser provides written notice to Johnson Yokogawa of any such defect within thirty (30) days after the appearance or discovery of such defect, Johnson Yokogawa shall, at its option, repair or replace the defective equipment. For equipment not installed by Johnson Yokogawa, if Purchaser returns the defective equipment to Johnson Yokogawa within thirty (30) days after appearance or discovery of such defect, Johnson Yokogawa shall, at its option, repair or replace the defective equipment and return said equipment to Purchaser. All transportation charges incurred in connection with the warranty for equipment not installed by Johnson Yokogawa shall be borne by Purchaser. These warranties do not extend to any equipment which has been repaired by others, abused, altered or misused, or which has not been properly and reasonably maintained. THESE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THOSE OF MERCHANTABILITY AND FITNESS FOR A SPECIFIC PURPOSE.

5. **LIABILITY.** Johnson Yokogawa shall not be liable for any special, indirect or consequential damages arising in any manner from the equipment or material furnished or the work performed pursuant to this agreement.

6. **TAXES.** The price of this proposal does not include duties, sales, use, excise, or other similar taxes, unless required by federal, state or local law. Purchaser shall pay, in addition to the stated price, all taxes not legally required to be paid by Johnson Yokogawa or, alternatively, shall provide Johnson Yokogawa with acceptable tax exemption certificates. Johnson Yokogawa shall provide Purchaser with any tax payment certificate upon request and after completion and acceptance of the work.

7. **DELAYS.** Johnson Yokogawa shall not be liable for any delay in the performance of the work resulting from or attributed to acts or circumstances beyond Johnson Yokogawa's control, including, but not limited to, acts of God, fire, riots, labor disputes, conditions of the premises, acts or omissions of the Purchaser, Owner, or other Contractors or delays caused by suppliers or subcontractors of Johnson Yokogawa, etc.

8. **COMPLIANCE WITH LAWS.** Johnson Yokogawa shall comply with all applicable federal, state and local laws and regulations and shall obtain all temporary licenses and permits required for the prosecution of the work. Licenses and permits of a permanent nature shall be procured and paid for by the Purchaser.

9. **ATTORNEYS' FEES.** Purchaser agrees that he will pay and reimburse Johnson Yokogawa for any and all reasonable attorneys' fees which are incurred by Johnson Yokogawa in the collection of amounts due and payable hereunder.

10. **INSURANCE.** Insurance coverage in excess of Johnson Yokogawa's standard limits will be furnished when requested and required. No credit will be given or premium paid by Johnson Yokogawa for insurance afforded by others.

11. **INDEMNITY.** The Parties hereto agree to indemnify each other from any and all liabilities, claims, expenses, losses or damages, including attorneys' fees, which may arise in connection with the execution of the work herein specified and which are caused, in whole or in part, by the negligent act or omission of the Indemnifying Party.

12. **OCCUPATIONAL SAFETY AND HEALTH.** The Parties hereto agree to notify each other immediately upon becoming aware of an inspection under, or any alleged violation of, the Occupational Safety and Health Act relating in any way to the project or project site.

13. **ENTIRE AGREEMENT.** This proposal, upon acceptance, shall constitute the entire agreement between the parties and supersedes any prior representations or understandings.

14. **CHANGES.** No change or modification of any of the terms and conditions stated herein shall be binding upon Johnson Yokogawa unless accepted by Johnson Yokogawa in writing.

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Johnson Yokogawa Corporation

Lake Michigan Carferry Service - Boiler Upgrade for S. S. BADGER
November 10, 1992

PRICE SUMMARY

Hardware Services	.....	$ 100,000.00
Engineering Services	.....	$ 50,000.00
TOTAL	.....	$ 150,000.00

200,000

Installation Services

Installation services and materials are estimated to cost approximately **$ 50,000.00**, subject to verification survey (see below). Johnson Yokogawa can provide these services, but due to the unique setting for the boilers, we suggest that Lake Michigan Carferry Service provide the materials and labor, and let Johnson Yokogawa provide the installation supervision services. For this proposal, we assume that we will supervise you or your agents craft labor.

Boiler Verification Survey

Johnson Yokogawa will provide approximately 2 days of engineering services to verify installation requirements, final control devices and existing instrumentation. This cost of **$ 2,000.00** would be credited to Lake Michigan Carferry Service when the order for the project is received.

Our proposal is based on standard Johnson Yokogawa Terms and Conditions, a copy of which is included for your review. The pricing quoted above is good for ninety days from date of proposal.

This proposal contains no provisions for asbestos removal. We also assume that all final control units are in working order.

With receipt of a purchase order by December 15, 1992, we feel confident that the boiler work will be completed by March 15, 1992, in time for the 1993 ferry season.

BASE SYSTEM FUNCTIONAL DESCRIPTION
(Please refer to Drawing LMCS-02)

PLANT MASTER CONTROLLER (PIC-01)

The Plant Master uses a PID controller to compare Header Pressure Setpoint to Actual Header Pressure in order to generate the Plant Demand Signal which is sent to the individual Boiler Masters. Setpoint and Output Tracking provide bumpless transitions from Manual to Automatic mode.

BOILER MASTER/ STOKER CONTROLLER (FIC-10)

The Boiler Master Controller allows for an operator adjustable Bias to be applied to the Plant Demand Signal. The resulting signal, Boiler Demand, is sent to the Stoker Drive and to both a Lag and High Select function to generate Air Flow Demand which is sent to the FD Controller. The purpose of the Lag and High Select logic is to avoid smoking by preventing Air Flow from dropping off quickly during load decreases. Output and Bias Tracking ensure bumpless Manual to Automatic transfers.

FD CONTROLLER (FIC-11)

Raw Air Flow is passed through a Square Root Extractor and a Function Generator to generate Characterized Air Flow. The Function Generator serves to match Air Flow to Stoker Speed and is characterized during Boiler Load Testing. Characterized Air Flow is compared to previously described Air Flow Demand in a PID controller. An operator adjustable Bias is provided allowing increases or decreases to Air Flow Demand as may be necessitated by changing coal quality or moisture content. The PID output is sent to the FD Damper Drive and to the Furnace Pressure Controller as a feedforward. Output Tracking ensures bumpless transfers.

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FURNACE PRESSURE CONTROLLER (PIC-12)

The output of the FD PID is passed through a Function Generator to generate a feedforward for the Draft Control logic. The Function Generator's characteristics are determined during Boiler Load Testing and is used to match Boiler Outlet Damper Position to FD Damper Position. This feedforward is trimmed by a PID controller which compares Furnace Pressure to an operator adjustable Setpoint. Setpoint and Output tracking provide bumpless Manual to Automatic transfers.

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OPTIONAL SYSTEM FUNCTIONAL DESCRIPTION
(Please refer to Drawing LMCS-03)

PLANT MASTER CONTROLLER (PIC-01)

When in Automatic mode the Plant Master uses Main Steam Header Pressure and the sum of the individual Boiler Steam Flows to generate the Plant Demand Signal which is sent to the individual Boiler Masters. The Plant Master may also be operated Manually.

"Target Steam Flow" is calculated and used as a feedforward in generating Plant Demand. Target Steam Flow is the ratio of operator adjustable Header Pressure Setpoint to Actual Header Pressure multiplied by Total Steam Flow:

$$\text{TARGET STEAM FLOW} = \frac{\text{HEADER PRESSURE SETPOINT} * \text{TOTAL STEAM FLOW}}{\text{ACTUAL HEADER PRESSURE}}$$

An increase in either Header Pressure Setpoint or Total Steam Flow or a decrease in Actual Header Pressure will increase Target Steam Flow. A decrease in Header Pressure Setpoint or Total Steam Flow or an increase in Actual Header Pressure will increase Target Steam Flow.

The Plant Master uses a PID controller to compare Header Pressure Setpoint to Actual Header Pressure and trims the Target Steam Flow feedforward to maintain the Steam Header at its Setpoint. Setpoint and Output Tracking provide bumpless transitions from Manual to Automatic mode.

BOILER MASTER/ STOKER CONTROLLER (FIC-10)

The Boiler Master Controller allows for an operator adjustable Bias to be applied to the Plant Demand Signal. The resulting signal, Boiler Demand, is compared to Boiler Steam Flow in a PID Controller. Steam Flow is used as a steady state inference

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of Coal Flow and allows for tighter Air/Coal ratio control than is possible with the Base System. The PID Output is sent to the Stoker Drive and to both a Lag and High Select function to generate Air Flow Demand which is sent to the FD Controller. The purpose of the Lag and High Select logic is to avoid smoking by preventing Air Flow from dropping off quickly during load decreases. Output and Bias Tracking ensure bumpless Manual to Automatic transfers.

FD CONTROLLER (FIC-11)

FURNACE PRESSURE CONTROLLER (PIC-12)

The FD and Furnace Pressure Controller logic is identical to the Base System. Please refer to the Base System description.

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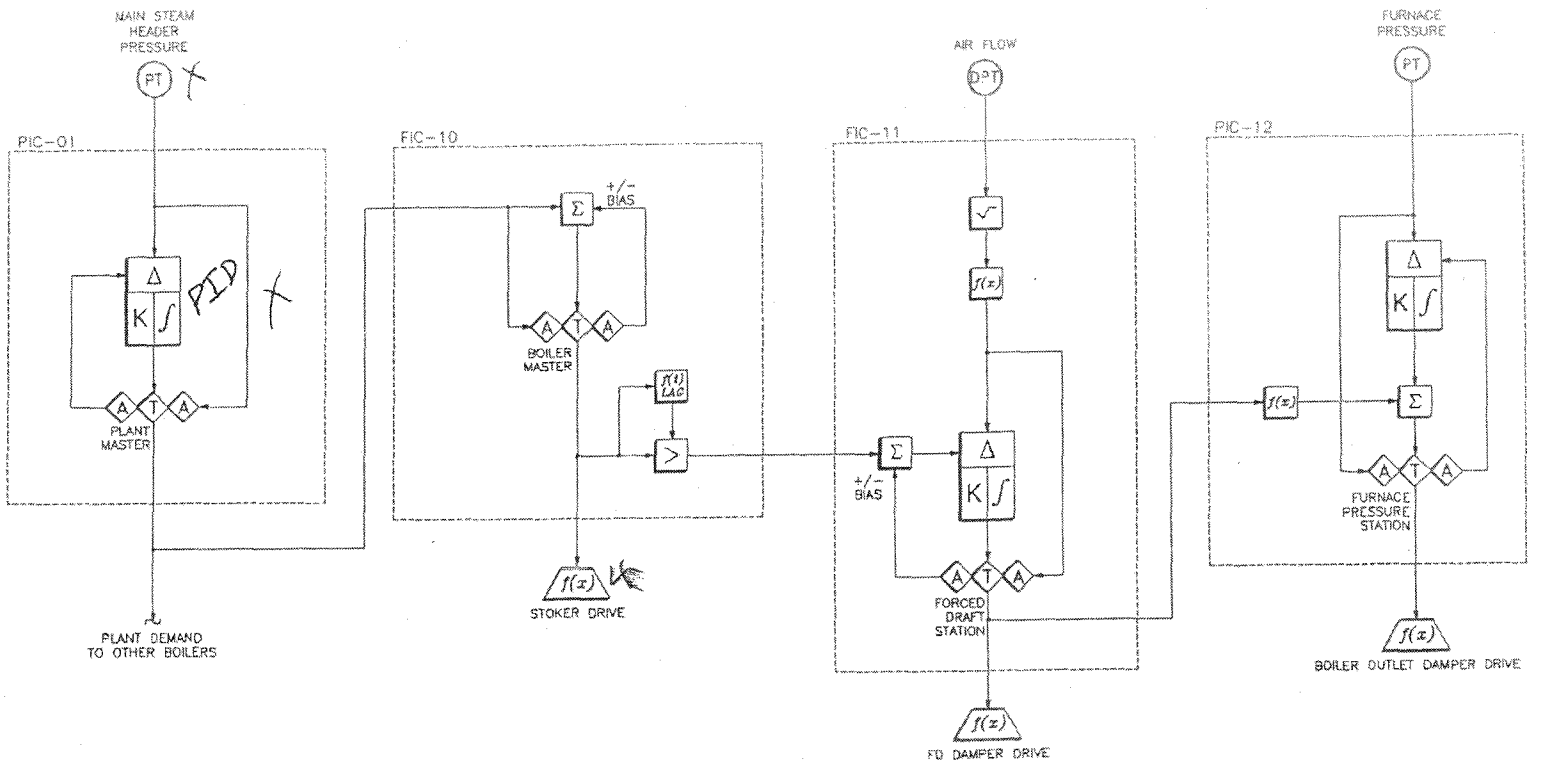
BASE SYSTEM



NOTES:

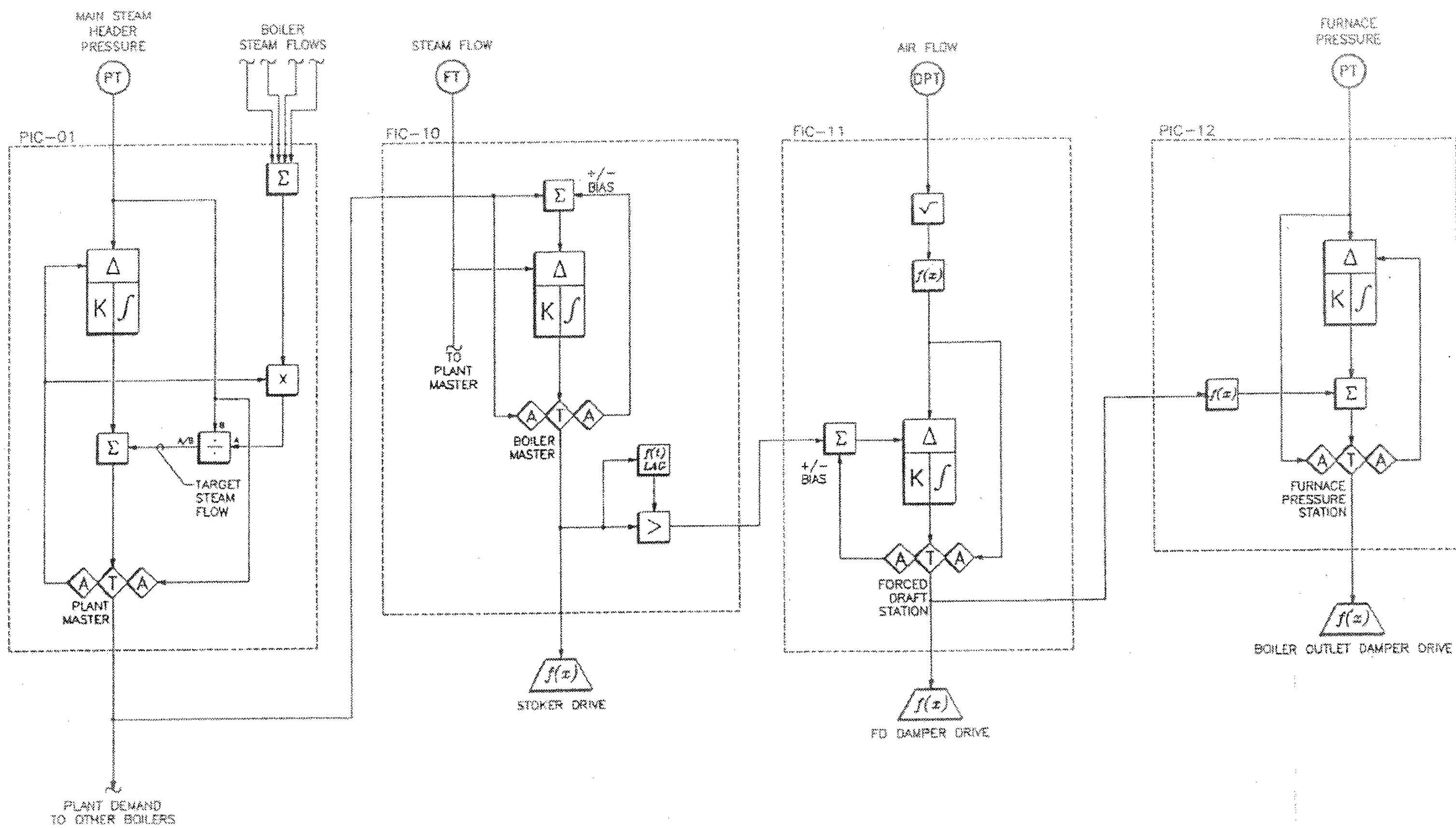
1.) THE ABOVE LOGIC REQUIRES NEW FURNACE PRESSURE, AIR FLOW, AND HEADER PRESSURE TRANSMITTERS, PLUS NEW STOKER, FD DAMPER, AND BOILER OUTLET DAMPER DRIVES.

2.) FIC-10, FIC-11, AND PIC-12 ARE REQUIRED FOR EACH BOILER.

LMCF00216

DRAWING TITLE: BoilerMaster PLANT MASTER AND SPREADER STOKER BOILER CONTROL LOGIC		
PROJECT: LAKE MICHIGAN CARFERRY SERVICES, INC.	JOHNSON YOKOGAWA, 690 W. GRAND AVE ELMHURST, IL 60126 708-941-0009	CONTRACT NUMBER: LMCS-02

OPTIONAL SYSTEM



NOTES:

1.) THE ABOVE LOGIC REQUIRES NEW FURNACE PRESSURE, AIR FLOW, HEADER PRESSURE AND STEAM FLOW TRANSMITTERS PLUS NEW STOKER, FD DAMPER, AND BOILER OUTLET DAMPER DRIVES.

2.) FIC-10, FIC-11, AND PIC-12 ARE REQUIRED FOR EACH BOILER.

LMCF00217

DRAWING TITLE: BoilerMaster PLANT MASTER AND SPREADER STOKER BOILER CONTROL LOGIC	REVISED PER SHIP SURVEY
PROJECT: LAKE MICHIGAN CARFERRY SERVICES, INC.	PROJECT ENGINEER: W Henkel
JOHNSON YOKOGAWA	DRAWING NUMBER: LMCS-03

ED HALLEN

MAURICE L. KELSEY & ASSOCIATES, INC. CONSULTING ENGINEERS

TELEPHONE (317) 872-6832

6835 FOX LAKE CT.
INDIANAPOLIS, INDIANA 46278

August 26, 1993

Lake Michigan Carferry Service, Inc.
P.O. Box 708
Ludington, Mi. 49431

Attn: Mr. James E. Anderson

Re: S.S. Badger Boiler Operation Survey

Dear Mr. Anderson:
As you Know I observed the S.S. Badger Boiler operation on Aug. 22, 1993 during a complete round trip from Ludington to Manitowoc and return. Th operating personnel aboard ship were very cooperative especially Dan Ramsey.

I observed the boiler operation and stack opacity at normal full speed conditions, at minimum steam load in port and during inbound and outbound from ports.

I also performed excess air (0_2) tests at full speed on three (3) boilers and made OFA (Overfire Air) adjustments.

Following are the results of my observations and testing:

1. OFA (Overfire Air)

Each boiler has a Buffalo 6E overfire air fan capable of about 1000 cfm at 30"H_20 pressure which supplies air to 7 one inch dia. nozzles. These nozzles are located 16" above the grate and supply air to create turbulence and oxygen to the fire. The purpose of overfire air is to supply 0_2 and mixing just above grate to burn up the unburned CO (Smoke).

We found one boiler OFA almost shut off and the other two only about 50% open. Dan Ramsey opened all OFA dampers to 100% and the stack opacity reduced from 40%-50% down to 20%-30%. See enclosed pictures of the stack opacity.
I recommend leaving these OFA dampers open 100% all the time. I also recommend that all 1" nozzles be checked via regular maintainence to make sure they are not plugged or covered with slag and check the discharge pressure of each fan with a manometer.

2. Combustion Tests (0_2-Excess Air)

I performed 0_2 tests on each boiler in service using my electronic Oxygen Analyzer while firing at full speed. Following are the results of these tests:

Boiler	Oxygen-%	Excess Air-%
Forward-Starboard	9.0%	100%
Forward-Port	15.2%	180%
Aft-Port	14.6%	170%

The normal boiler outlet flue gas 0_2% at full load should be 5% to 6% or 40% to 50% excess air.

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The boiler efficiency loss due to this high excess air is estimated at 10% to 20%. If I would hace had been able to measure the flue gas temperature at the I.D. Fan inlets I could calculate the actual boiler efficiencies. When you are able to give me these temperatures I will calculate the actual boiler efficiencies via the ASME Heat Loss Method.

3. Existing Boiler Combustion Controls

Presently the only combustion control on these boilers is the new "Master Controller" which sends a signal to each boiler stoker controller to either increase or decrease the coal feed.
The furnace draft controllers are not operational and the forced draft fans inlet dampers are all manually set at about 70% open.
The I.D. Fans (Induced Draft) are set at 1700Rpm. There is presently no automatic fuel/air combustion control and no method of monitoring excess air (0_2) or boiler load.

4. Recommendations

The existing new Yokogawa Master Controller is functioning properly by sending equal signals to each stoker feed actuater i.e. each boiler receives the same signal from the master to increase or decrease coal feed to maintain the desired steam pressure.
My recommendations for new controls are as follows:

A. Install a new furnace draft controller for each boiler and a new boiler outlet damper actuator on each boiler.
Note: The I.D. Fan speed would remain constant at a preset RPM. Furnace pressure (draft) would be controlled via the boiler outlet dampers.

B. Install new electric actuators on all stokers and on all forced draft fan inlet dampers.
Note: The new actuators should be similiar to the new Beck unit which is now installed on the Aft-Starboard Boiler.
C. Install a new Boiler Sub-Master Controller on each boiler with a fuel/air ratio manual control.

5. Sequence of Operation

a. Furnace Draft
Furnace draft control will be independent of the boiler Master or Sub-Master controls. Furnace draft of $-.10"H_20$ to $-.15"H_20$ will be maintained automatically with the abiIity to manually set the furnace draft at any point.
b. Fuel/Air Control
The boiler submaster will send signals to both the fuel (stoker) and air (forced draft) in a preset ratio at all loads to maintain the proper excess air (0_2) for the most efficient operation and to maintain the lowest attainable stack opacity.

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This fuel/air controller will operate automatically at all boiler loads if the controls are properly set up after installation. Note: New combustion controls are of little help in increasing boiler efficiency or opacity reduction if they are not set up correctly and instructions given to the operators as to proper operation.
If fuel quality (BTU,ash,sizing,etc.) changes the operator will have the capability of changing the submaster preset fuel/air ratio with the manual ratio station.
The recommended new submasters would recieve thier signal from the existing new Yokogawa Master.

6. Alternate Recommendations

a. Oxygen Analyzer

We highly recommend that new Zirconium In-Situ Oxygen Analyzers be installed in each boiler outlet for the following reason:

Will enable boiler operators to fine tune (fuel/air) during full speed operation to maintain highest boiler efficiency and lowest stack opacity.

b. Steam Flowmeters

At present time operators have no way of knowing each boiler steam output.
I checked the 6" steam leads from each boiler and determined that a steam flow orifice could be installed in each boiler.
I recommend that a new steam flowmeter be installed in each boiler. Using an orifice type flowmeter the maximum pressure drop thru the orifice would be about 4 psi at full boiler load.

c. Monitoring Equipment

I recommend that the flue gas temperature at the economizer outlet be monitored and/or recorded. This could be recorded on the same chart with the steam flow.
The flue gas temperature monitoring will tell operators when to blow soot, indicate possible air leakage problems and along with the recommended O_2 Analyzer give an indication of boiler performance.

Summary

The basic differences in my recommendations as compared to the Johnson/Yokogawa proposal are as follows:

1. I do not recommend the air flow transmitters be installed after observing your boiler operation - they would not help your opacity problem and in all probability would give you more problems.

2. Instead of the "Lag" system they have offered I recommend the manual fuel/air ratio control. The boilers are brought from low load to full load so fast that the lag system offered would do no good.

3. I definitely do not recommend the 0_2 Trim on this type of operation - the 0_2 Trim would have to be shut off during entering or leaving ports and during constant speed operation the operator can observe the 0_2 and manually change the fuel/air rario if required.

4. I do recommend steam flowmeters of a different type than Johnson/Yokogawa but do not recommend they be connected to the plant master. They would not help in controlling the boiler operation.

I presently have Mr. All Beal of Beal Control Service here in Indianapolis working up an equipment cost for all that I have recommended. I will submit this cost estimate to you along with my calculated boiler efficiencies after I recieve the flue gas temperatures from you.

Johnson/Yokogawa Controls are suitable for your application and I believe are less costly than some other brands. Mr. Beal is working up his cost estimate based on these controls.

Enclosed please find 2 pictures of the before and after stack opacities when Dan and I readjusted the OFA Fan dampers.

Yours truly,

Maurice L. Kelsey, P.E.
President

Encl.
cc: Mr. Al Beal

MLK/mlk

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MAURICE L. KELSEY & ASSOCIATES, INC. CONSULTING ENGINEERS

TELEPHONE (317) 872-6832

6835 FOX LAKE CT.
INDIANAPOLIS, INDIANA 46278

August 10, 1999

Lake Michigan Carferry Service, Inc.
P.O.Box 708
Ludington, Mich. 49431

Attn: Mr. James E. Anderson

Re: S. S. Badger Boiler Operation Observation, Testing and Recommendations.

Dear Mr. Anderson:

As per your request I observed the S.S. Badger Boiler and Auxiliary Equipment operation and performed some informal Boiler Efficiency Testing during a round trip on July 28, 1999.

Following are the results of my observations, test results and recommendations:

1. Observations:

While in port in Ludington and Manitowoc the stack opacity was 50% + or - 10% and up to 80% when leaving and entering ports. During the cruise at full speed the opacity reduced to approximately 25%.

The opacity in ports and leaving and entering ports was not much different than during the observations done in 1993 when I performed a similar inspection. The full speed opacity was also similar to the 1993 trip after I had your operators to open the overfire air fan dampers.

I performed "Excess Air" (Oxygen %) and Boiler Efficiency checks on each of the Boilers at full speed to compare these values with the 1993 checks.

Following are the results of these excess air and efficiency checks:

Boiler Location	Forward Starboard		Forward Port		Aft Port	
Year Checked	1993	1999	1993	1999	1993	1999
02% @ Boiler Outlet	9.0	13.0	15.2	9.6	14.6	11.0
Excess Air-%	100	154	180	79.5	170	103.5
Boiler Efficiency-%	79.6	77.8	66.3	81.1	71.2	79.8

Note: The furnace draft during the 1993 checks was -2" to -2.5" H20 on all Boilers with the Boiler outlet dampers 100% open and the Induce Draft Fans operating at approximately 1700 RPM.

During these 1999 checks the furnace draft was approximately -.15" to -.20" of H20 with the Induced Draft Fans operating at about 1450 RPM and the outlet dampers at less than 100% open.

Summary of Observations:

As can be noted from the test results above the reduction in excess has increased the Boiler efficiencies. The main reason the excess air has reduced is because of the reduced furnace draft. The furnace draft can now be regulated with the adjustable boiler outlet dampers.

The Boiler outlet dampers now have controllers capable of modulating the damper positions which in turn control the furnace draft.

The Forced Draft Fans also now have damper controllers to modulate the fan output to the Boilers. These damper controllers are now controlled be hand because they do not have loop controllers yet which would also control the coal feed actuators.

It appears that you have installed all of the actuators on the fuel feed, forced draft and boiler outlet dampers that I recommended in 1993. You have not installed all of the loop controllers that automatically control these dampers except for the boiler outlet dampers which appear to be operating reasonably well but should be fined tuned after the addition of the fuel/air controls are installed and tuned.

Summary and Recommendations:

1. Boiler Controls & Instrumentation:

I recommend that flue gas temperature monitoring be installed on each Boiler. I believe you are in the process of installing these temperature sensors now.

I recommend that you install 1/4" SS tubing from each Boiler outlet (after the economizer) down to a central location by the control panel for use as an Oxygen sampling station. After this is done then use your portable Oxygen Analyzer on a daily or weekly schedule to check the excess air on each boiler while at full speed.

By checking the O2% (Excess Air) your operators then can manually adjust the fuel/air ratios to maintain optimum excess air and greatly increase the Boiler efficiency. Once you get the automatic fuel/air loop controllers installed and tuned the excess air will stay close to optimum conditions.

This winter I also recommend that the boiler outlet dampers and forced draft inlet dampers be cleaned and adjusted so that the actuators will open them 100% and they closed tight with the actuators.

The smoking tendencies while at port and entering leaving ports can be reduced with Boiler firemen being more conscientious. Boiler automatic controls are really not very useful during these conditions.

The Captain did during this trip leave port and entered port without going from "Stop" position to "Full" position or the reverse which helped curtail the smoking tendencies.

These Boilers have overfire air entering from only one side of the firebox. I recommend that when the Boiler load is reduced from full to low load or standby conditions that the grate on the opposite from the overfire air inlet be dumped and that underfire damper be closed 100%. Also the forced draft air be almost closed at the same time because the incoming overfire air should almost be enough air to burn the coal on the grate side left in service. When leaving port the under grate air on the side that has been dumped should be opened then coal raked over to this side and burning should start.

I assume that the steam pressure must be maintained at all times in port to provide steam for the steam driven auxiliaries such as the electric generator turbine and induced draft fans etc. With coal burning on one side of the grate adjacent to the overfire air nozzles the Boilers should put out enough steam to maintain pressure and smoking should be reduced. I was told by your fireman that they normally do not shut off the underfire air on the grate that has been dumped.

We certainly appreciated the courtesy we received during this trip. You have completed a lot of my 1993 recommendations in regards the installation of actuators and furnace draft controls.

Yours truly,

Maurice L. Kelsey

Maurice L. Kelsey,P.E.
President

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ATTACHMENT E-2

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Contains confidential business Information
CBI treatment requested

October 27, 2008

Attn: Duane Heaton
Water Enforcement & Compliance Assurance Branch (WC-15J)
U.S. EPA Region 5
77 West Jackson Blvd.
Chicago, Illinois 60604-3590

RE: Lake Michigan Trans-Lake Shortcut, Inc.
A/K/A Lake Michigan Carferry Service
701 Maritime Drive
Ludington, Michigan 49431

Response to Request for Information Pursuant to Section 308 of the Clean Water Act (33 U.S.C. § 1318)

1. Provide a diagram of the S.S. Badger showing locations of coal storage bunkers, boilers, storage areas for the coal ash, conveyor system for the coal ash, and the discharge points of coal ash to Lake Michigan.

Attachment A shows an outboard and inboard profile of the Badger. The coal storage bunkers and boiler room are labeled. The "bottom ash" accumulates in the bottom of the boiler itself and is not separately shown. Coal ash accumulates in the economizer, which is not visible on Attachment A. Coal ash also accumulates in the storage hoppers for the dust collectors, which are marked on Attachment A as "Dust collector storage hoppers."

It is important to note that these drawings cannot fully depict all of the equipment that is present. There is an extraordinarily large amount of equipment that was

designed and built into confined spaces. Depicting all of this equipment on a single drawing would result in an almost illegible document.

Attachment B shows an Engine Room Overhead View and Engine Room Elevation. The Engine Room Elevation drawing depicts the location of the coal bunker (labeled next to the number "8").[1] The four boilers are depicted on the Engine Room Overhead View. The location under each boiler where ash accumulates is labeled on the Engine Room Elevation view as "bottom ash collection points." The vacuum conveyor system for the ash is depicted in blue on both views. The discharge points of coal ash to Lake Michigan are depicted at the end of each arrow where the words "Frame 95"[2] are written. It indicates the Frame number where the discharge points are located.

The original blueprint for this system, which was constructed into and as part of the Badger and still exists in its original structure, is included as Attachment C.

2. Describe in narrative form all processes in the utilization and ultimate disposal of coal ash from the S.S. Badger, including but not limited to, the transport of coal on board, the storage of coal prior to use in boilers, any pulverizing or other preparation of the coal, the transfer of coal to boilers, the removal of coal ash from boilers, the quenching and/or storage of coal

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[1] These responses refer to location points on Attachments A and B. Those points correspond to photographs with the same number that are included in this response as well.

[2] Locations on ships like the Badger are determined by "frames" and "strakes" on the hull plate. Each frame is numbered, starting with 1 at the bow and moving from bow to stern (front to back), at two-foot intervals. Each strake is labeled starting from A on either side of the keel and with subsequent letters at variable distances as one moves up the hull from the keel. Thus, the discharge points for the coal ash are located at Frame 95, Strake K.

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ash after removal from boilers, the transfer of coal ash to the conveyor system, the conveyor system for moving the coal ash, and the ultimate discharge (identifying the point of exit of S.S. Badger to Lake Michigan). Provide any existing diagrams, illustrations, or photographs (including any accompanying reports or descriptions) that show these processes.

Coal is purchased from the Manitowoc Public Utility, located next to the slip where the Badger docks, in Manitowoc, Wisconsin. A photograph of the coal storage area is attached as Photo 15. A driver transfers coal from the Reiss Coal facility (described in our prior submission in response to a Clean Air Act information request) onto a Hopper semi-trailer ("Hopper"). Using the Hopper, the driver then transfers the coal approximately 500 yards from the Reiss Coal facility onto the Badger, where it is deposited in the Badger's bunker. Photo 16 shows the truck leaving the coal facility. Photo 17 shows a close-up of the bottom of the truck sitting on top of the bunker before it drops the coal into the bunker. This is explained in the Badger's June 26, 2008 response to the Clean Air Act Request for Information from EPA Region V and is further depicted in photos provided with that submission. (LMC 00038-42)

After delivery aboard by the Hopper truck, there are three stages of coal handling aboard the Badger: fuel transfer, combustion, and ash discharge. The systems used are original to the vessel and have not been significantly altered since the vessel was built in 1952.

Fuel Transfer

Coal is stored aboard the vessel in a space designated as the "main bunker," located forward of the boiler room between watertight bulkheads 61 and 82, athwartship[3] the width of the vessel and vertically from the bunker floor to the deckhead

[3] Athwartship means the bunkers extend the entire width of the vessel.

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under the car deck. The coal bunker is shown on Attachment B at location 8 and is pictured on Photo 8 attached to this submission. The coal bunker is approximately 42 feet long, 56 feet wide, and 20 feet high.

Coal is transferred from the main bunker to the day bunkers (location noted on Attachment B as "Day bunker"), which delivers the coal for use in the boilers.[4] This is accomplished by manually operating a series of Stephens-Adamson conveyor systems. Specifically, Simplex quadrant gates are manually adjusted to allow the coal to drop vertically a distance of 24 inches onto one of two Style "F" apron conveyors. This pair of conveyors moves the coal from either the port or starboard side of the main bunker as needed. These conveyors are not operated simultaneously. The "Port apron conveyor" and "Starboard apron conveyor" are labeled on Attachments A and B. (Photo 11 is taken from between the two conveyors looking toward the port side conveyor.) Each conveyor transports the coal aft (toward back of vessel) to Frame 83, where it is delivered to a pair of Ring-type, single rotor, Knittel crushers.

The coal passes through the Knittel crushers, which are located on Attachment B on both the Engine Room Overhead View and the Engine Room Elevation View.[5] The coal is then delivered through a watertight closure[6] at location Frame 83 into a hopper feeding 9" L-type Redler conveyor-elevators. These locations are depicted on

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[4] The outside of the Starboard day bunker can be seen in Photo 10.

[5] While the system was designed to handle coal of all sizes, the desirable size of coal for these boilers is approximately ½". Coal is generally received in sizes that are often smaller than what is desired; therefore, the coal often passes through the crusher without being impacted. Occasionally, larger pieces that pass through are actually crushed.

[6] The yellow lines on Attachment B indicate watertight compartments.

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Attachment A. (Photo 2 shows a long, square piece of equipment, which is the Redler conveyor.) There are two of these crusher-elevator systems for redundancy; however, only one is operated at a time. The Redler conveyor-elevator moves the coal aft, passes under and between the forward boilers for a distance of 30 feet (Photo 3), and then vertically 30 feet (Photo 12 and location 12 on Attachment B), delivering the fuel into another hopper on the center-line at Frame 98. From this hopper, coal is fed outboard to the port and starboard day bunkers, via four variable pitch screw conveyors, to each port and starboard bunker. The port and starboard conveyors are divided both longitudinally and transversely, forming four chutes to feed the coal by gravity, vertically downward into each of two Hoffman Type-C overfeed stokers (Photo 1) mounted to the front of each boiler. The day bunkers are just above the area labeled "Day bunkers" on the Engine Room Overhead View on Attachment B. This transfer process from the coal bunkers to the day bunkers takes approximately 30 minutes and is repeated once during each four-hour watch.

Combustion

Each of the four Foster Wheeler D-type main propulsion boilers is fitted with stoker fronts designed by Hoffman Combustion Engineering. Two Firerite Model 41 Type-C spreader stokers (Photo 1 and labeled "Stokers") receive coal from their respective day bunkers via chutes delivering to the top of the variable feed plate. Feed rate is controlled through mechanical linkages with input transmitted from a Yokagowa processor interface drive, which derives its signal from main steam manifold pressure. (In other words, the rate at which coal actually enters the furnace is determined by sensors that monitor the steam pressure to determine feed input rate.)

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Each boiler furnace contains two zones, one inboard and one outboard. The stokers, used singly or in pairs as required to accommodate steam demand, deliver fuel for combustion onto "dump grates" in each of their respective zones in each furnace. When the Badger is in port and steam demand is somewhat reduced, three stokers (one for each boiler) are manually disconnected to prevent coal from entering the boiler. This allows the fire in one zone of each boiler to substantially burn out. This takes approximately 15 minutes. The fireman[7] then tips the dump grate so that the ashes drop down into the floor of the boiler below the grate. The collection points are shown on Attachment B near the boiler and are labeled "bottom ash collection points." The grates are then replaced to their horizontal position, the stoker is reconnected, and coal enters the boiler to renew the fire in that zone. Once the boilers stabilize, the same process is followed with the three stokers serving the other zones in each boiler. Thus, by the time the Badger is ready to leave the port, the boilers are fully operational, and the bottom ash is collected in the bottom of the boilers, in each of two zones in each boiler. The ash is held here until such time as the vessel is in waters suitable for ash discharge.

Ash Removal and Discharge

The ash removal discharge system has two components: 1) the United Conveyor vacuum conveyor system, which was constructed as part of the Badger's original furnace system, into which ash is placed from its various locations, and 2) the pumping system, which is also a part of the original construction and that uses the water flow to create the air vacuum in the conveyor system that pulls the ash from the system into the

[7] The fireman is the person who runs the boiler room.

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water stream and discharges it from the vessel. The current ash conveyor system is depicted on Attachment B in blue, and the original and current blueprint is included as Attachment C. The pumping system is depicted in green. The vacuum point is created where the two systems intersect near the ash discharge points. Below is the description of how the ash conveyor system is connected to the boiler system, how solid ash enters the system, and how the pump system creates the vacuum for the ash conveyor system and pulls the solid ash into the water for discharge. Each of these systems is constructed into the vessel such that its various components (especially piping) weave in and out of very small and confined locations, into and out of several decks, and are constructed to avoid breaching watertight compartments.

Ash Removal and the Ash Conveyor System

The solid ash from the bottom of each boiler is manually pulled out of the boiler and into a receiver constructed into the system about 16 inches from the boiler. These receivers are depicted on Photo 1 and on Attachment B at location 1 and at various locations labeled as "R" near the boilers. To remove the ash from the bottom of a boiler, the fireman must close the damper in the back of the boiler through which air is fed for combustion (called forced draft), and then he can safely open the access door to the front of the boiler. Using special tools, the solid bottom ash is then pulled out of the bottom of the boiler zone through the access door and directly into the receiver and ash discharge system, in which the ongoing vacuum immediately carries the solid ash to the discharge point. Photo 1 depicts the boiler, the access doors, the damper linkage, and the receivers.

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This process is repeated for each boiler zone, until all six zones (two in each boiler) have been emptied. Each zone takes roughly 10 minutes of labor to feed into the conveyor with about five minutes required to move to the next zone and to allow the combustion process to restabilize before beginning the process in the next zone. The ash is only actually being discharged while the receiver is accepting the ash. Being a manual process, the variation in time needed to move the ash into the system from each boiler zone is dependent on a variety of factors a (e.g., who is removing the coal, are there interruptions, etc.).

During operation, ash is also collecting in the economizers and the dust collectors. Each boiler has its own economizer. The economizer uses the exhaust gas from the boiler to heat the feedwater prior to its entry into the boiler. As the exhaust gas changes direction, solid ash falls to the bottom of the economizer. The economizer box is shown on Photo 2, and its location is depicted on Attachment B at location 2. Receivers are constructed as part of the structure such that they are located to remove coal ash collected in the economizer boxes. The operating rod that opens the valve in the economizer to allow for this removal is depicted in Photo 2, and it is shown in Attachment B at location 2. The receiver for each economizer is labeled as R-E on Attachment B.

To remove ash from the economizer box, the operating rod must be moved to open three valves (depicted on Photo 2) to allow the vacuum system in the ash conveyor to draw ash from the box. Then, the economizer box access door must be opened and a special tool is used to move the collected ash into the system, where it is immediately carried via the vacuum conveyor system to the discharge point. Again, this

process takes roughly 10 minutes per economizer. There are usually three economizers to address. As with the boilers, ash is only actually being discharged while the receivers serving the economizers are opened and receiving ash.

The dust collectors also gather solid ash that is precipitated out of the gas stream by the Pratt-Daniel Cyclone separators located in the up-take just below the induced draft fans. This ash collects in storage hoppers (designated on Attachment B as "Dust collector storage hoppers"). The blue vertical line below the dust collector storage hoppers is ash conveyor piping constructed into the hoppers that draws the collector ash into the ash discharge system. Photo 13 shows the piping and valve that is opened to permit the ash to enter the discharge system. That valve is also depicted on Attachment B at point 13. The valve depicted in Photo 13 is opened, allowing the ash conveyor vacuum system to draw the ash down into the conveyor system. The vacuum pulls the solid ash toward the discharge point for combination with water and immediate discharge. Both collectors are emptied at the same time, which takes approximately 15 minutes and is subject to variation. As with the boilers and economizers, ash is only actually being discharged when the valve is opened.

Pumping System

Lake water at 180 psi / 650 gpm supplied by the ship's fire and general service pumps[8] is directed to a 6" Hydroveyor exhauster located at the ships side port and starboard in the boiler room, immediately aft of Frame 95 in strake "K." This location is depicted on Attachment B, Engine Room Overhead View, labeled "Frame 95" and "ash ejector." It is also labeled on the Engine Room Elevation View. These exhausters (also

[8] The pump system is shown on Attachment B in green.

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called "nozzle blocks") use water pressure to generate vacuum, which provides an air flow through the ash conveyor system. It is this movement of air that entrains the solid coal ash as it is fed into the conveyor and transports it from the receivers described above (labeled in Photo 1) to the nozzle block. This system also draws the ash from the collector when the valve is opened as described above. Anytime this system is on, the vacuum is active, even if ash is not being actively discharged.

The vacuum system pulls the solid ash toward the nozzle block, and immediately after the coal passes the nozzle block, the coal ash and water join through a combining pipe (about 24 inches long) before exiting the Badger through a shell plating. The discharge stream impacts a hardened alloy plate that deflects and disperses the force of water. (This is depicted on Photo 14.)

It is important to note that even though the ash conveyor system is operating (water is being pumped and the vacuum is created), ash is not necessarily being discharged. This is explained below. Rather, ash is discharged at varying times to meet operational needs.

3. Provide the estimated average amount of weight of fly ash released and an estimated amount of fly ash that falls back into Lake Michigan on a daily, monthly and yearly basis, along with an explanation of how estimates were derived. If the amount varies over the operating season, provide monthly amounts as they vary over the season.

We are not aware of any means by which the estimated average amount of weight of fly ash released and an estimated amount of fly ash that falls back into Lake Michigan on a daily, monthly and yearly basis can be estimated. General visual observations do not reveal emissions of fly ash, except on rare occasions such as the operational upset that is addressed in the Badger's June 26, 2008 response to the

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Clean Air Act information request from EPA Region V. The decks of the vessel are continuously maintained and cleaned, and absent an operational upset, there is generally little or no evidence of fly ash on the deck of the vessel.

4. **Describe all other discharges or releases from the S.S. Badger to Lake Michigan, whether or not LMC considers them to be incidental discharges from routine operations of the vessel. Such discharges shall include, but not be limited to, any water containing any additives or other chemicals used to control scale formation, corrosion, pH, or solids deposition in the boiler water, or used for any cleaning purposes on board the vessel.**

Discharges from the Badger include weather deck wash down, run-off, and rinse water generated as the anchors and chain are retrieved and stowed. (This discharge does not include "chain locker effluent," which is not generated from the Badger.) Cooling water is circulated from Lake Michigan and directed through heat exchangers for main condensers, air conditioning and refrigeration units, ice machines, generators, and auxiliary equipment. Ballast water and cooling water are used to adjust vessel trim. Flushing water is also discharged from water softeners. Additionally, water is released from the boilers to control boiler water level and internal chemistry.

It is important to note that the Badger disposes of all oily bilge water ashore, collects and disposes of all grey and black water ashore, and carries only 470 tons of ballast and cooling water, which is acquired and discharged mid-lake. Water intake while in port is avoided wherever possible by redistributing ballast and trimming tanks.

5. **Provide a list of any additives and other chemicals described in No. 4 above, along with the amount of each discharged on a daily, monthly, and yearly basis. If the amounts vary over the operating season, provide monthly amounts as they vary over the season. If the amounts are not known, provide estimates and an explanation of how the estimates were derived.**

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The Badger uses a boiler chemistry program designed for vessels with reciprocating propulsion engines by the Nalco Chemical Company of Naperville, Illinois.

Prescribed additives are used in the boiler feedwater to control scale formation, dissolved gasses, and pH. Specifically, Nalco 18-S is used to control scale, Nalco 1720 is used to control dissolved oxygen, Nalco 2873 is used as a condensate system corrosion inhibitor, and Nalco 2584 is used as an added alkalinity source. *See* Attachments D-1 - D-4, the Material Safety Data Sheets for each of these prescribed additives, for specific information. It should be noted that none of these chemicals are used or stored in reportable quantities as defined under Comprehensive Environmental Response, Compensation, and Liability Act/ Superfund requirements; none of them are listed in the Michigan Critical Materials registry; and two of them are certified Kosher by the Chicago Rabbinical Council.

ByPas 1525 biodegradable liquid detergent, a product of ByPas International of Hudsonville, Michigan, is used as a general purpose cleaner aboard the vessel and may be included in weather deck run-off.

Typically, each operating boiler receives one bottom blow and one surface blow per week, done in rotation, one per day, in the port of Ludington. With a calculated 115 gallons of treated boiler water discharged per blow-down, the estimated volume of treated boiler water discharged would be 115 gallons per day, 690 gallons per week, 2,760 gallons per month, or 15,180 gallons of boiler water discharged per year. Additionally, it is calculated that 1,900 gallons are released per week through the continuous blowdown system (that is, 7,600 gallons per month and 41,800 gallons per season). Combining these two estimates produces an estimated total treated boiler

water discharge of 386 gallons per day, 2,705 gallons per week, 10,820 gallons per month, and 59,510 gallons per season.

Based on daily water softener logs, it is estimated that the Badger generates 1,312,810 gallons of soft water for use in the boiler feed system. 59,519 of the total 1,312,810 gallons of soft water for use in the boiler feed system are discharged overboard during the season. This amount is equal to about 4.53 percent [1,312,810 x 4.5 percent = 59,470] of the total feedwater generated.

Based on daily chemical logs, it is estimated that 15 dry ounces per day of 18-S, 60 liquid ounces per day of 1720, 6.4 liquid ounces of 2873, and 3.8 liquid ounces per day of 2584 are added during the season. 18-S is added directly to each boiler and is not present in the steam generated from each boiler. 18-S has no direct measurement in the boiler chemistry testing, as 18-S is used to control total dissolved solids. The 15 ounces added daily is a maintenance quantity determined by testing for dissolved solids in the boiler water. There is no test available to us to determine the concentration of 18-S present in the boiler water. Thus, while we cannot estimate the true daily or monthly concentrations discharged, we do know that all of the chemical added over the season is discharged via the 67 bottom blows done in that span of time and that the volume of these bottom blows is approximately 13,590 gallons (66 x 115 = 7590 + 6000 = 13590), which results in an average of 0.011 #/gallon.

(15oz/16oz per # x 154 days/13590 gallons = 0.0106#/gallon)

1720 is added to the feedwater system and is carried over with the steam to circulate through the system. 1720 is discharged overboard in all three types of boiler blow-down (bottom, surface, and continuous) for approximately 4.53 percent of the total

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feedwater; however, the vast majority is pumped ashore in bilge and grey water. The 60 ounces per day used as a standard daily dose is added to the entire 1,312,810 gallons of boiler feedwater generated over the course of the operating season. This calculates to an average concentration of 60 floz x 154 days = 9240 floz/ 128 floz per gal = 72.1875 gallons/ 1,312,810 gallons = 0.000054 /1.312810 = 0.000042 ppm. Unlike the previous chemical, 1720 is discharged in both types of boiler blowdown (15,180 gallons in the port of Ludington only), as well as the continuous blowdown (41,800 gallons discharged equally over the season). Therefore, two blowdowns per week per boiler at 115 gallons each equal 690 gallons plus 1,900 gallons of continuous blowdown for 2,590 gallons of treated water containing 0.000042 ppm of 1720. [Note that 1720 is included in the blowdowns noted above for 18-S.]

2873 is added to the boiler feedwater in the same manner as 1720 and is carried throughout the system. The 6.4 liquid ounces used as a daily maintenance dose is added to the entire 1,312,810 gallons of treated feedwater generated. This should calculate to an average concentration of 0.0000045 ppm that is included in the blowdowns noted above.

3.8 liquid ounces of 2584 are added to the entire feedwater stream as a daily maintenance dose over the course of the operating season and are included in the boiler water discharged during periodic and continuous blowdowns. This daily usage provides an average concentration of 0.00000265 ppm.

6. Describe the frequencies and locations of all discharges of coal ash from the S.S. Badger to Lake Michigan. The description should include whether any discharges occur while in either port or harbor, and whether there is a continuous discharge while underway or whether at various intervals while underway. Locations should include the distance from nearest shore

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(including whether from the Wisconsin or Michigan shore), approximate depth of water, and any factors considered in deciding the frequencies and locations of the discharges to Lake Michigan.

Coal ash is typically discharged while the vessel is underway in Lake Michigan. The discharge begins when the Badger passes approximately the 100 foot depth line, about 20 minutes out of port.[9] The ash is removed sequentially from each of the six boiler zones, then the three economizer boxes, then the dust collectors. The ash conveyor system is operational on a more or less continuous basis (that is, the vacuum is created whenever the pumping system is on, and the pumping system is on to serve fire and general service most of the time). However, unless the ash is entering the system through the various receivers and pipes, the ash conveyor system is not being drawn toward the water pipe that ejects it.

The process for removing ash from each of the six boiler zones is described in response to Question 2. As noted there, each zone takes roughly 10 minutes of labor to feed into the conveyor with about five minutes required to move to the next zone and allow the combustion process to restabilize before beginning the next zone. The ash is only actually being discharged while the receiver is accepting the ash. The variation is dependent on a variety of factors (e.g., who is removing the coal, are there interruptions, etc.). Thus, ash is being discharged from each boiler for a total of roughly 60 minutes, in 10-minute intervals, with a several-minute nondischarge period occurring between each interval.

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[9] For safety or operational requirements there are some discharges in port, but generally only on the Ludington side. This occurs when the discharge cannot be completed while underway due to other exigencies of the trip and there the retention of the ash, when the vessel must layover, creates concerns over boiler operation.

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The removal of ash from the economizers occurs after removal of ash from the boilers is complete. This process is described in response to Question 2. As noted previously, this process takes roughly 10 minutes per economizer, with a few-minute nondischarge intervals to provide for closing and adjusting valves and reconfiguring the system. Thus, discharge of the ash from the economizer takes about 30 minutes, in roughly 10-minute intervals.

The removal of the ash collected by the cyclone separators in the up-take occurs next. The process for removing the ash is described in response to Question 2. As noted, it takes approximately 15 to 20 minutes to allow this ash to enter the conveyor system, and it immediately moves through the system by vacuum, enters the water pipe, and is discharged. As with the boilers and economizers, ash is only actually being discharged when the valve is opened.

In sum, the actual ash discharge occurs during about 2 ½ hours of the four-hour voyage across Lake Michigan. Each component of the total ash discharge process will vary in duration, some variations due to the manual nature of feeding the system.

The relevant 100-foot depth lines for Lake Michigan, at the closest points to the Michigan and Wisconsin shores, are 6.5 miles and 4.5 miles, respectively. Water depth varies from 100 feet to over 520 feet during discharges.

The locations of discharges vary considerably, depending on the Badger's course and weather conditions. The cumulative course of the Badger over a season tends to look like a bow tie. Based on experience, it is believed that the Badger's

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course could cover an area in excess of 1,000 square miles over the course of the season.

7. The average amount of weight and volume of coal ash discharged to Lake Michigan on a daily, weekly, monthly, and yearly basis. If the amounts vary over the operating season, provide monthly amounts as they vary over the season. If the amounts are not known, provide estimates and an explanation of how the estimates were derived.

LMC has never kept records of the amount of coal ash that the Badger discharges because it has not been required by law to do so, and the discharge has historically been exempted from regulation under the Clean Water Act. However, in order to respond to this request for information, the Badger conducted an experiment in order to provide some basis for estimating these discharges. This experiment is described below.

On its last trip of the season on October 12, 2008, the Badger retained all of the ash generated (from the boiler pit, economizers, and collectors) during a 12-hour period, which included one round-trip from Ludington, Michigan to Manitowoc, Wisconsin. As it left Ludington at 7 a.m., the boiler room crew was instructed that the only ash to be discharged was that which was generated before 7 a.m. on October 12. The Badger arrived at Manitowoc at about noon and began its return trip at about 2 p.m. The Badger returned to Ludington at about 7 p.m.

When the vessel arrived at Ludington, the ash that had accumulated in the boiler, economizer, and collectors was removed using a vacuum truck. This process took approximately 7 ½ to 8 hours. The truck was weighed before and after the bottom ash was removed. The difference was approximately 3,500 lbs. Then, the economizer and

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collector ash was removed. Together, this ash weighed approximately 1,500 lbs.[10] Thus, the total amount of ash generated over the 12-hour period from 7 a.m. to 7 p.m. on October 12 was approximately 5,000 lbs (2.5 tons). The measurement of the economizers and collectors was also observed when they were full. Each of the three economizers is approximately .88 cubic yard (yd^3), which was rounded up to 1 yd^3. Each of the three collectors is 3 yd^3. When combined, therefore, the capacity of the economizers and collectors is roughly equal to one another. Having observed that they were all full of ash and knowing that the combined ash collected in these locations was about 1,500 lbs, it was concluded that each economizer and collector had held approximately 750 lbs of ash.

Based on the amount of coal purchased over the 2008 season [redacted] (Attachment E), and the fact that the vessel operated 154 days, we concluded that, during each 24-hour period of operation, the Badger consumed 55.90 tons. Thus, the 12-hour test period consumed 27.95 tons of coal (55,900 lbs) and generated approximately 5,000 lbs of ash, resulting in an 8.94 percent ash generation rate. Analysis of the coal used reveals an approximate seven percent ash content, which assumes "perfect" combustion, which never occurs. This is documented in Attachment B to the June 26, 2008 response to the Clean Air Act information request.

Assuming an 8.94 percent ash generation rate, it is estimated the Badger generated (and discharged) approximately 1,539,468 lbs of ash (769.7 tons) in 2008.

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[10] There was not enough time to shut down the system in order to weigh the truck separately for the collectors and economizers, as the truck had to be at the landfill prior to 6 p.m.

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Assuming that 750 lbs of the 5,000 lbs of ash generated during the test period comes from the collector (which is located below the stack), then 15 percent of the ash generated from the Badger, or 231,068 lbs, represents ash that is generated during one season (yearly) in the collector.

In addition, as explained above, ash is not discharged continuously. Based on work practices, actual discharges from the boiler, economizer, and collectors occur for approximately 150 minutes at intervals described above during the four-hour trip across Lake Michigan. During a single trip across the lake, 97,500 gallons of water, or 812,175 lbs of water, carry out 2,500 lbs of ash during that 150-minute period of active ash discharge. It appears from this data that the ash content of the water is in the range of 2,500 ppm to 3,100 ppm.

8. Provide copies of analytical results conducted by or on behalf of LMC of all past analyses of coal ash. The information provided should include all parameters, dates, locations, names and addresses of all laboratories utilized, analytical methods utilized, chain-of-custody sheets associated with each analysis, and the costs of the analyses.

Attachment F contains the test results for a sample that was taken aboard the Badger in mid-October 2006. We are unaware of any chain of custody records. The price for the analysis was $1,971.00. Please see reports for all analytical methods used. This is all of the information the Badger has on this sample.

Attachment G is a sample taken aboard the Badger on August 28, 2008. The cost for the analysis was $3,519.00. Please see reports for all analytical methods used. This is all of the information the Badger has on this sample.

See response to Question 15 for other test results.

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9. Discuss the reason LMC conducted any laboratory analyses on the coal ash, and how the analytical results were utilized in the operation and/or maintenance of the S.S. Badger.

The 2006 test was conducted to confirm that the ash discharged from the Badger was nonhazardous. *See* Attachment F. The August 2008 test was also conducted to confirm that the ash discharged from the Badger was nonhazardous. *See* Attachment G. The October 2008 analysis was done at the request of EPA.

10. Provide copies of any other known laboratory analyses of the coal ash from the S.S. Badger, if not conducted by or on behalf of LMC. If you know of any such analyses, but do not have copies of the information in No. 8 above, provide the names, addresses, phone numbers, or other contact information of all individuals conducting the analyses.

We are unaware of any other laboratory analyses of coal ash conducted by or on behalf of LMC, except for the analyses conducted for Question 14.

11. Provide any studies planned, underway, or completed by or on behalf of LMC of actual or potential impacts to human health or the environment resulting from the discharge of coal ash from the S.S. Badger to Lake Michigan. Provide the names, addresses, phone numbers, or other contact information of all individuals conducting the studies, dates of the studies, and costs of the studies.

To the best of our knowledge, there are no studies planned, underway, completed by, or being conducted on behalf of LMC on actual or potential impacts to human health or the environment resulting from the discharge of coal ash from the Badger.

12. Discuss why any such studies in No. 11 above were or are being conducted, and how the findings of any such studies have been or will be utilized in the operation and/or maintenance of the S.S. Badger.

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Not applicable.

13. **Provide a copy of all other known studies planned, underway, or completed on the actual or potential impacts to human health or the environment, resulting from the discharge of coal ash from S.S. Badger to Lake Michigan. Provide the names of individuals conducting the studies and dates of the studies.**

We are unaware of any known studies planned, underway, or completed on the actual or potential impacts to human health or the environment as a result of the discharge of coal ash from the Badger to Lake Michigan.

14. **If not already fully provided in your response to Request No. 8 for coals currently used, conduct sampling within 21 days and analysis within 60 days from the receipt of this Request, of a representative sample of coal ash that would otherwise be discharged from the S.S. Badger to Lake Michigan. If necessary to obtain a representative sample due to unequal combustion of the coal at various periods (e.g., full power at departure, underway, lower power at arrival) or other reason, multiple samples can be proportionately composited to obtain a representative sample. The representative sample shall be analyzed for (i) metals, utilizing SW-846 Method 3052 for sample preparation followed by analysis utilizing Method 6020A and Method 6010B, but report the results for each metal only from the most appropriate method; (ii) mercury, utilizing SW-846 Method 3052 for sample preparation followed by analysis utilizing Method 7471B; (iii) polycyclic aromatic hydrocarbons (PAH), utilizing SW-846 Method 3545A, 3540C, 3546, or 3561 for sample preparation followed by analysis utilizing Method 8270; and (iv) pH, utilizing SW-846 Method 9045D. The information provided should include: (a) the analytical results from all EPA-certified laboratories conducting the analyses, (b) your sampling plan, (c) the date(s) sample(s) was (were) taken, (d) the location(s) on-board where the sample(s) was (were) taken, (e) the names and addresses of all EPA-certified laboratories utilized, (f) the analytical methods utilized, (g) the chain-of-custody sheets associated with each analysis, and (h) any quality assurance/quality control documents. You must submit all analytical results from all laboratories conducting the analyses.**

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See Attachments H-1 - H-3. The laboratory certifications relating to these test results have not yet been received. Attachment H-1 represents a sample of the boiler ash. Attachment H-2 represents a sample of the economizer ash and the collector ash. Attachment H-3 represents a composite sample of the boiler ash, economizer ash, and collector ash.

15. **Within 21 days and analysis within 60 days from the receipt of this Request, conduct sampling of water from the surface of each harbor on 5 different days in Manitowoc, Wisconsin and on 5 different days in Ludington, Michigan. The samples should be representative of the upper six inches of the water column and be collected within 50 to 100 feet downwind of the vessel approximately 30 minutes prior to departure from the dock. Samples should be analyzed for metals, PAHs, and total suspended solids, utilizing the appropriate methods in 40 CFR Part 136. Information provided should include the information in Request No. 14(a)-(i) above. You must submit all analytical results from all laboratories conducting the analyses.**

LMC was advised that it was not required to conduct this test. However, prior to that advice, we had taken three random samples of the surface water near the Badger. The results are attached as Attachment I-1 and I-2.

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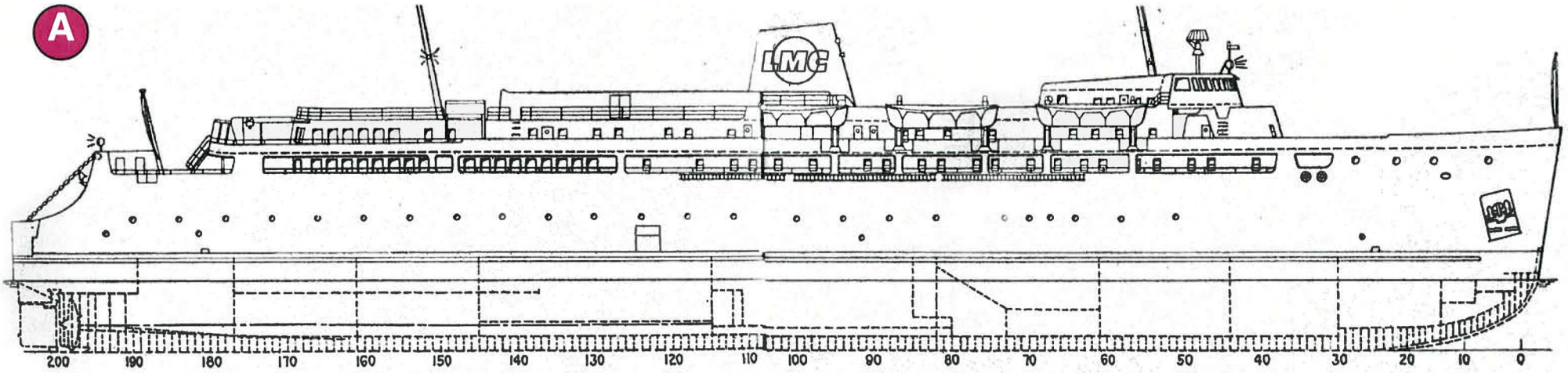
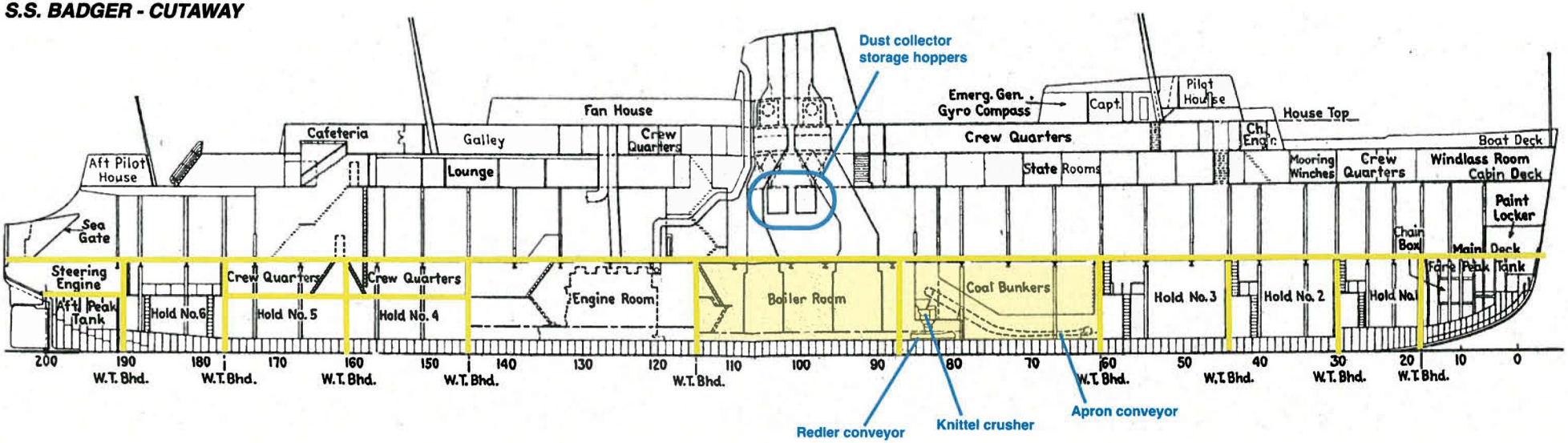
ATTACHMENT A

S.S. BADGER - EXTERIOR



S.S. BADGER - CUTAWAY



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ATTACHMENT B

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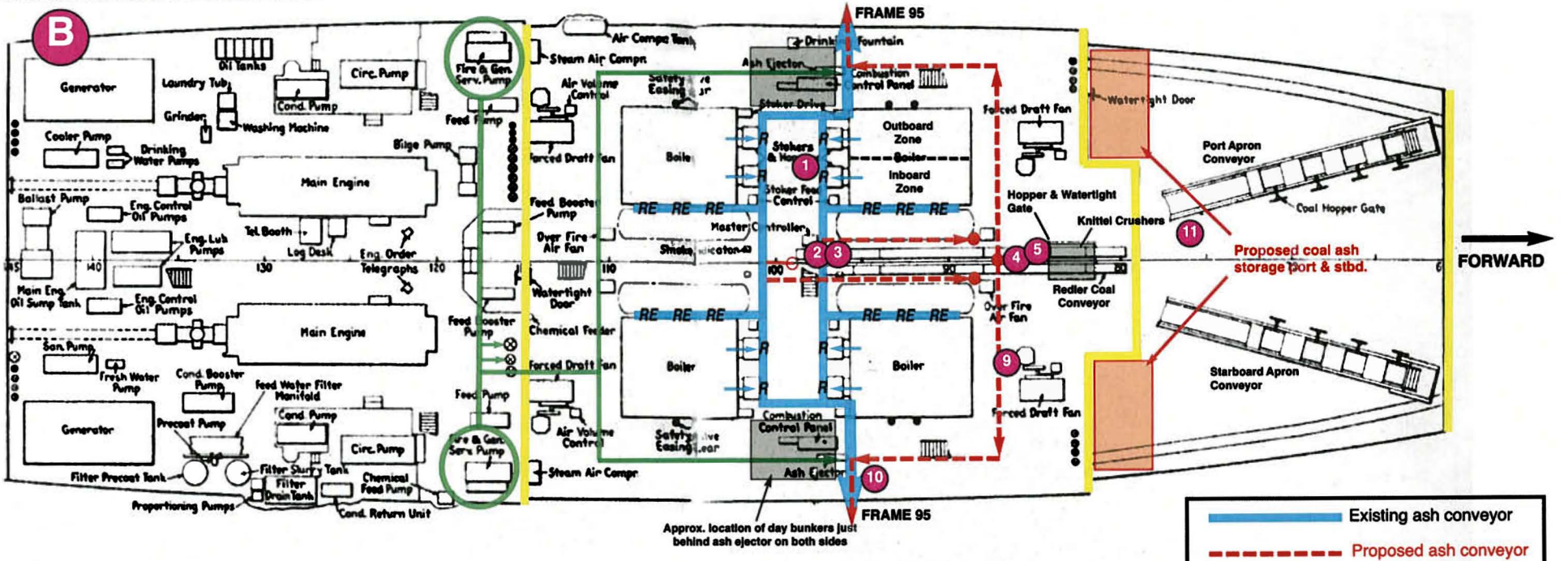
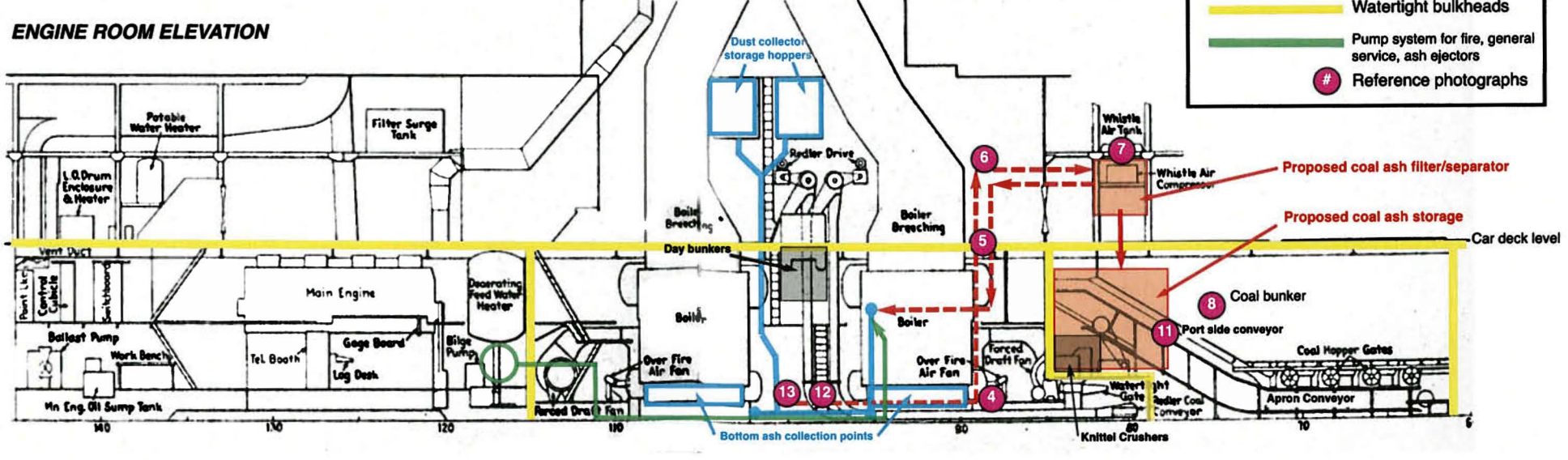
ENGINE ROOM OVERHEAD VIEW



ENGINE ROOM ELEVATION



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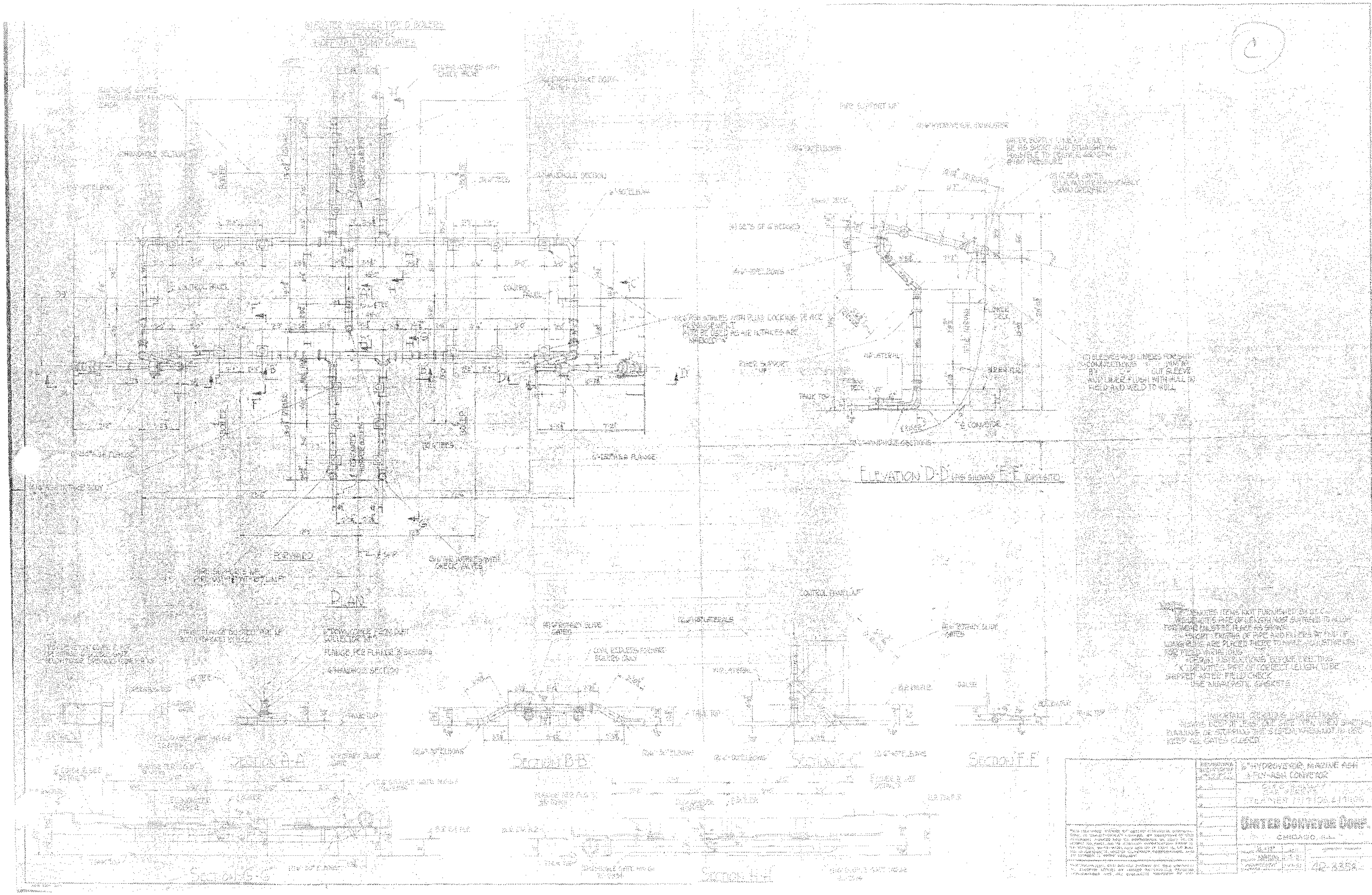
ATTACHMENT C


PLAN
ELEVATION D-D
SECTION A-A
SECTION B-B
SECTION C-C
SECTION F-F
SECTION G-G
SECTION H-H
HYDROVEYOR, MARINE ASH & FLY-ASH CONVEYOR
UNITED CONVEYOR CORP.
CHICAGO, ILL.

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ATTACHMENT
D-1

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NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

NALCO 18S PULV

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NALCO 18S PULV**

APPLICATION : WATER TREATMENT

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 0 / 0 FLAMMABILITY : 0 / 0 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Sodium Pyrophosphate	7722-88-5	1.0 - 5.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

CAUTION
May cause irritation with prolonged contact.
Do not get in eyes, on skin, on clothing. Do not take internally. Do not breathe dust. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear suitable protective clothing.
Not flammable or combustible.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin, Inhalation

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
May cause irritation with prolonged contact.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Not a likely route of exposure. Harmful if swallowed.

INHALATION :
If dust is generated, can cause mucous membrane irritation. A single brief inhalation exposure (minutes) is not likely to cause serious effects.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
A review of available data does not identify any symptoms from exposure not previously mentioned.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush eye with water for at least 15 minutes while holding eyelids open. If irritation persists, repeat flushing. If only one eye is affected be sure to use care not to contaminate the other eye with the run-off. Get immediate medical attention.

SKIN CONTACT :
Immediately flush with plenty of water for at least 15 minutes. If skin irritation persists, obtain medical attention.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. Get medical attention. If unconsious, do not give anything by mouth, place in the recovery position, check breathing and pulse. If necessary give artifical respiration.

INHALATION :
Remove to fresh air, treat symptomatically. Get medical attention.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : None

EXTINGUISHING MEDIA :
Use extinguishing media appropriate for surrounding fire. Not expected to burn.

FIRE AND EXPLOSION HAZARD :
Not flammable or combustible.

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SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Notify appropriate government, occupational health and safety and environmental authorities. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection).

METHODS FOR CLEANING UP :
For powder: Clean up promptly by scoop or vacuum. Reclaim into recovery or salvage drums. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Avoid generating dusts. Avoid release of dusts or mists into workplace air. Use with adequate ventilation. Do not get in eyes, on skin, on clothing. Do not take internally.

STORAGE CONDITIONS :
Keep in dry place.

SUITABLE CONSTRUCTION MATERIAL :
HDPE (high density polyethylene), Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Available exposure limits for the substance(s) are shown below.

ACGIH/TLV :

Substance(s)	
Tetrasodium Pyrophosphate	TWA: 5 mg/m3

OSHA/PEL :

Substance(s)	
Tetrasodium Pyrophosphate	TWA: 5 mg/m3

ENGINEERING MEASURES :
Use general ventilation with local exhaust ventilation. Local exhaust ventilation may be necessary when dusts or mists are generated.

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RESPIRATORY PROTECTION :
Due to its low volatility and toxicity, the hazard potential associated with this material is relatively low. If dusts are generated, use an approved air-purifying respirator. A dust, mist, fume cartridge may be used. HALF-FACE MASK WITH PURPLE CARTRIDGE

HAND PROTECTION :
Impervious gloves

SKIN PROTECTION :
Wear standard protective clothing. Wear protective overalls, chemical splash goggles and impervious gloves.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Keep a safety shower available. Keep an eye wash fountain available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: High

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Powder
APPEARANCE	White
ODOR	Mild

BULK DENSITY	63 lb/ft3
SOLUBILITY IN WATER	Complete
pH (1 %)	8.8
VAPOR DENSITY	No data available.
VOC CONTENT	0 % Calculated

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Moisture

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MATERIALS TO AVOID :
None known

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of phosphorus, Oxides of carbon

11. TOXICOLOGICAL INFORMATION

No toxicity studies have been conducted on this product.

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Low

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Bluegill Sunfish	96.00 hrs	100 - 1,000 mg/l	Product
Rainbow Trout	96.00 hrs	100 - 1,000 mg/l	Product

MOBILITY :
High phosphate levels in surface water can cause eutrophication with subsequent algal blooms and oxygen depletion.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Moderate

If released into the environment, see CERCLA/SUPERFUND in Section 15.

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13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

Dispose of wastes in an approved incinerator or waste treatment/disposal site, in accordance with all applicable regulations. Do not dispose of wastes in local sewer or with normal garbage. This waste can be incinerated in accordance with regulations.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

The presence of an RQ component (Reportable Quantity for U.S. EPA and DOT) in this product causes it to be regulated with an additional description of RQ for road, or as a class 9 for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

LAND TRANSPORT :

Proper Shipping Name :	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Technical Name(s) :	SODIUM PHOSPHATE, TRIBASIC
UN/ID No :	UN 3077
Hazard Class - Primary :	9
Packing Group :	III
Flash Point :	None

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name :	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Technical Name(s) :	SODIUM PHOSPHATE, TRIBASIC
UN/ID No :	UN 3077
Hazard Class - Primary :	9
Packing Group :	III
IATA Cargo Packing Instructions :	911
IATA Cargo Aircraft Limit :	NO LIMIT (Max net quantity per package)

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	PRODUCT IS NOT REGULATED DURING TRANSPORTATION

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15. REGULATORY INFORMATION

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Sodium Pyrophosphate : Non-Hazardous

CERCLA/SUPERFUND, 40 CFR 117, 302 :
This product contains the following Reportable Quantity (RQ) Substance. Also listed is the RQ for the product.

RQ Substance	RQ
Sodium Tripolyphosphate	5,700 lbs

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
	Delayed (Chronic) Health Hazard
	Fire Hazard
	Sudden Release of Pressure Hazard
	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals., This product contains the following substance(s), (with CAS # and % range) which appear(s) on the List of Toxic Chemicals

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 173.310 Boiler Water Additives

Limitations: no more than required to produce intended technical effect.

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NSF NON-FOOD COMPOUNDS REGISTRATION PROGRAM (former USDA List of Proprietary Substances & Non-Food Compounds) :
NSF Registration number for this product is : 062464
This product is acceptable for use in meat, poultry, and other food processing areas as a Boiler Treatment Product (G6), for treating boiler and steam lines where the steam produced may contact edible products. Acceptable usage shall be in accordance with the dosage limitations specified on the product label.

This product has been certified as KOSHER/PAREVE for year-round use EXCEPT FOR THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
This product contains the following substances listed in the regulation:

Substance(s)	Citations
• Sodium Tripolyphosphate	Sec. 311

CLEAN AIR ACT, Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
This product contains the following substances listed in the regulation:, None of the substances are specifically listed in the regulation.

CALIFORNIA PROPOSITION 65 :
This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :
None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Sodium Tripolyphosphate 7758-29-4

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
Not considered a WHMIS controlled product.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substances in this preparation are listed on the Domestic Substances List (DSL), are exempt, or have been reported in accordance with the New Substances Notification Regulations.

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INTERNATIONAL CHEMICAL CONTROL LAWS

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

US EPA ARCHIVE DOCUMENT

Ariel Insight# (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 05/03/2006
Version Number : 1.11

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

ATTACHMENT
D-2

US EPA ARCHIVE DOCUMENT

NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

NALCO 1720

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NALCO 1720**

APPLICATION : OXYGEN SCAVENGER

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 1 / 2 FLAMMABILITY : 0 / 0 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Sodium Bisulfite	7631-90-5	10.0 - 30.0
Potassium Bisulfite	7773-03-7	1.0 - 5.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

WARNING
Harmful if swallowed. Contains Sulfite. Causes asthmatic signs and symptoms in hyper-reactive individuals. Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear suitable protective clothing.
May evolve oxides of sulfur (SOx) under fire conditions. May evolve hydrogen sulfide (H2S) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin, Inhalation

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Can cause mild irritation.

SKIN CONTACT :
Can cause mild irritation.

INGESTION :
Not a likely route of exposure. May cause asthmatic-like attack.

INHALATION :
Irritant to respiratory system. Causes asthmatic signs and symptoms in hyper-reactive individuals.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
A review of available data does not identify any symptoms from exposure not previously mentioned.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

HUMAN HEALTH HAZARDS - CHRONIC :
Ingestion of sulfite can cause a severe allergic reaction in asthmatics and some sulfite sensitive individuals. The resulting symptoms can include difficulty in breathing, flushed skin and a rash. Chronic exposure to sulfites may cause symptoms of upper respiratory disease and affect sense of taste and smell.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush eye with water for at least 15 minutes while holding eyelids open. If irritation persists, repeat flushing. Get immediate medical attention.

SKIN CONTACT :
Immediately flush with plenty of water for at least 15 minutes. If symptoms persist, call a physician.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. Get medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. If breathing is difficult, administer oxygen. Get medical attention.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : None

EXTINGUISHING MEDIA :
Not expected to burn. Use extinguishing media appropriate for surrounding fire. Keep containers cool by spraying with water.

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FIRE AND EXPLOSION HAZARD :
May evolve oxides of sulfur (SOx) under fire conditions. May evolve hydrogen sulfide (H2S) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Ensure clean-up is conducted by trained personnel only. Ensure adequate ventilation. Do not touch spilled material. Stop or reduce any leaks if it is safe to do so. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Wash site of spillage thoroughly with water. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Avoid eye and skin contact. Do not take internally. Do not get in eyes, on skin, on clothing. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labelled. Keep the containers closed when not in use. Use with adequate ventilation.

STORAGE CONDITIONS :
Store the containers tightly closed. Store in suitable labelled containers. Store separately from acids. Store separately from oxidizers. Amine and sulphite products should not be stored within close proximity or resulting vapors may form visible airborne particles.

SUITABLE CONSTRUCTION MATERIAL :
Polypropylene, Buna-N, EPDM, Polyethylene, Polyurethane, PVC, Neoprene, Hypalon, Viton

UNSUITABLE CONSTRUCTION MATERIAL :
Brass, Mild steel, Stainless Steel 304, Stainless Steel 316L, 100% phenolic resin liner, Epoxy phenolic resin

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8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below. Exposure limits are listed for sulfur dioxide (SO2) since this product evolves SO2 when open to the atmosphere.

ACGIH/TLV :

Substance(s)	
Sodium Bisulfite	TWA: 5 mg/m3
Sulfur Dioxide	TWA: 2 ppm , 5.2 mg/m3 STEL: 5 ppm , 13 mg/m3

OSHA/PEL :

Substance(s)	
Sodium Bisulfite	TWA: 5 mg/m3
Sulfur Dioxide	TWA: 2 ppm , 5 mg/m3 STEL: 5 ppm , 13 mg/m3

ENGINEERING MEASURES :
General ventilation is recommended. Use local exhaust ventilation if necessary to control airborne mist and vapor.

RESPIRATORY PROTECTION :
If significant mists, vapors or aerosols are generated an approved respirator is recommended. An acid gas cartridge may be used. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
Neoprene gloves, Nitrile gloves, Butyl gloves, PVC gloves

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Keep an eye wash fountain available. Keep a safety shower available.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

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9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Clear Pink
ODOR	Pungent
SPECIFIC GRAVITY	1.22 - 1.28 @ 60 °F / 15.6 °C
DENSITY	10.1 - 10.7 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	3.5 - 4.1
VISCOSITY	5 cps @ 60 °F / 15 °C
FREEZING POINT	11 °F / -11 °C
BOILING POINT	205 °F / 96 °C
VOC CONTENT	0 % Calculated

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Freezing temperatures.

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors. Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors. SO2 may react with vapors from neutralizing amines and may produce a visible cloud of amine salt particles.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of sulfur, Hydrogen sulfide (H2S)

11. TOXICOLOGICAL INFORMATION

The following results are for a similar product.

ACUTE ORAL TOXICITY :

Species	LD50	Test Descriptor
Rat	4,112 mg/kg	Similar Product

Rating : Non-Hazardous

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ACUTE DERMAL TOXICITY :

Species	LD50	Test Descriptor
Rabbit	> 3,000 mg/kg	Similar Product

Rating : Non-Hazardous

PRIMARY SKIN IRRITATION :

Draize Score	Test Descriptor
1.0 / 8.0	Similar Product

Rating : Minimally irritating

PRIMARY EYE IRRITATION :

Draize Score	Test Descriptor
9.4 / 110.0	Similar Product

Rating : Minimally irritating

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Low

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Fathead Minnow	96 hrs	382 mg/l	Product
Inland Silverside	96 hrs	> 5,000 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	728 mg/l		Product
Mysid Shrimp (Mysidopsis bahia)	96 hrs	> 5,000 mg/l		Product

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM , provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of

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the models. If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
The product will not bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: High

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Hazardous wastes must be transported by a licensed hazardous waste transporter and disposed of or treated in a properly licensed hazardous waste treatment, storage, disposal or recycling facility. Consult local, state, and federal regulations for specific requirements.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

The presence of an RQ component (Reportable Quantity for U.S. EPA and DOT) in this product causes it to be regulated with an additional description of RQ for road, or as a class 9 for road and air, ONLY when the net weight in the package exceeds the calculated RQ for the product.

LAND TRANSPORT :

Proper Shipping Name :	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Technical Name(s) :	SODIUM BISULFITE
UN/ID No :	UN 3082
Hazard Class - Primary :	9
Packing Group :	III
Flash Point :	None

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DOT Reportable Quantity (per package) :	18,350 lbs
DOT RQ Component :	SODIUM BISULFITE

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name :	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Technical Name(s) :	SODIUM BISULFITE
UN/ID No :	UN 3082
Hazard Class - Primary :	9
Packing Group :	III
IATA Cargo Packing Instructions :	914
IATA Cargo Aircraft Limit :	NO LIMIT (Max net quantity per package)

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Sodium Bisulfite : Respiratory irritant
Potassium Bisulfite : Irritant

CERCLA/SUPERFUND, 40 CFR 117, 302 :
This product contains the following Reportable Quantity (RQ) Substance. Also listed is the RQ for the product.

RQ Substance	RQ
Sodium Bisulfite	18,000 lbs

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard

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- Fire Hazard
- Sudden Release of Pressure Hazard
- Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 173.310 Boiler Water Additives

Limitations: no more than required to produce intended technical effect.

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
This product contains the following substances listed in the regulation:

Substance(s)	Citations
• Sodium Bisulfite	Sec. 311

CLEAN AIR ACT, Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
None of the substances are specifically listed in the regulation.

CALIFORNIA PROPOSITION 65 :
This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :
None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Sodium Bisulfite 7631-90-5

NATIONAL REGULATIONS, CANADA :

US EPA ARCHIVE DOCUMENT

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
D2B - Materials Causing Other Toxic Effects - Toxic Material

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substances in this preparation are listed on the Domestic Substances List (DSL), are exempt, or have been reported in accordance with the New Substances Notification Regulations.

INTERNATIONAL CHEMICAL CONTROL LAWS

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Chemical Control Law and are listed on the Inventory of Existing Chemical Substances China (IECSC).
This product's trade name is registered with the Chemical Registration Center (CRC) , Beijing.

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Ministry of International Trade & industry List (MITI).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)
This product's trade name is registered with the Korean Ministry of Environment (KMOE).

NEW ZEALAND
This product complies with Parts XI - XV of the HSNO Act (1996).

THE PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippine Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

F100777

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

US EPA ARCHIVE DOCUMENT

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight# (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department

US EPA ARCHIVE DOCUMENT

PRODUCT

NALCO 1720

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

Date issued : 04/25/2006
Version Number : 4.0

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

ATTACHMENT
D-3

US EPA ARCHIVE DOCUMENT

NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

NALFLEET® 2873

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NALFLEET® 2873**

APPLICATION : CORROSION INHIBITORINHIBITOR

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 3 / 3 FLAMMABILITY : 2 / 2 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Morpholine	110-91-8	5.0 - 10.0
Cyclohexylamine	108-91-8	10.0 - 30.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

DANGER
Corrosive. May cause tissue damage. Combustible. Harmful in contact with skin and if swallowed Vapors may have a strong offensive odor which may cause sensory response including headache, nausea and vomiting. Keep away from heat. Keep away from sources of ignition - No smoking. Keep container tightly closed and in a well-ventilated place. Do not get in eyes, on skin, on clothing. Do not take internally. Avoid breathing vapor. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear a face shield. Wear chemical resistant apron, chemical splash goggles, impervious gloves and boots. Combustible Liquid; may form combustible mixtures at or above the flash point. Empty product containers may contain product residue. Do not pressurize, cut, heat, weld, or expose containers to flame or other sources of ignition. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin, Inhalation

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Corrosive. Will cause eye burns and permanent tissue damage. Exposure to low vapor concentrations can result in foggy or blurred vision, objects appearing bluish and appearance of a halo around lights. These symptoms are temporary.

SKIN CONTACT :
May cause severe irritation or tissue damage depending on the length of exposure and the type of first aid administered. Harmful if absorbed through skin.

INGESTION :
Not a likely route of exposure. Corrosive; causes chemical burns to the mouth, throat and stomach. Harmful if swallowed.

INHALATION :
Irritating, in high concentrations, to the eyes, nose, throat and lungs. Vapors may have a strong offensive odor which may cause sensory response including headache, nausea and vomiting.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
A review of available data does not identify any symptoms from exposure not previously mentioned.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

HUMAN HEALTH HAZARDS - CHRONIC :
No adverse effects expected other than those mentioned above.

4. FIRST AID MEASURES

EYE CONTACT :
Get immediate medical attention. PROMPT ACTION IS ESSENTIAL IN CASE OF CONTACT. Immediately flush eye with water for at least 15 minutes while holding eyelids open.

SKIN CONTACT :
Get immediate medical attention. Immediately flush with plenty of water for at least 15 minutes. For a large splash, flood body under a shower. Remove contaminated clothing. Wash off affected area immediately with plenty of water. Contaminated clothing, shoes, and leather goods must be discarded or cleaned before re-use.

INGESTION :
Get immediate medical attention. DO NOT INDUCE VOMITING. If conscious, washout mouth and give water to drink.

INHALATION :
Get medical attention. Remove to fresh air, treat symptomatically.

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NOTE TO PHYSICIAN :
Probable mucosal damage may contraindicate the use of gastric lavage. Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : 135 °F / 57.2 °C (PMCC)

EXTINGUISHING MEDIA :
Foam, Carbon dioxide, Dry powder, Other extinguishing agent suitable for Class B fires, For large fires, use water spray or fog, thoroughly drenching the burning material.
Water mist may be used to cool closed containers.

FIRE AND EXPLOSION HAZARD :
Combustible Liquid; may form combustible mixtures at or above the flash point. Empty product containers may contain product residue. Do not pressurize, cut, heat, weld, or expose containers to flame or other sources of ignition. May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Stop or reduce any leaks if it is safe to do so. Ventilate spill area if possible. Remove sources of ignition. Ensure clean-up is conducted by trained personnel only. Do not touch spilled material. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Clean contaminated surfaces with water or aqueous cleaning agents. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Avoid generating aerosols and mists. Keep the containers closed when not in use. Keep away from acids and oxidizing agents. Do not use, store, spill or pour near heat, sparks or open flame. Ensure all containers are labelled. Have emergency equipment (for fires, spills, leaks, etc.) readily available.

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STORAGE CONDITIONS :
Store in suitable labelled containers. Store the containers tightly closed. Store away from heat and sources of ignition. Have appropriate fire extinguishers available in and near the storage area. Connections must be grounded to avoid electrical charges. Store separately from oxidizers. Store separately from acids. Amine and sulphite products should not be stored within close proximity or resulting vapors may form visible airborne particles.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

ACGIH/TLV :

Substance(s)	
Morpholine	TWA: 20 ppm , 71 mg/m3 (Skin)
Cyclohexylamine	TWA: 10 ppm , 41 mg/m3

OSHA/PEL :

Substance(s)	
Morpholine	TWA: 20 ppm , 70 mg/m3 (Skin) STEL: 30 ppm , 105 mg/m3 (Skin)
Cyclohexylamine	TWA: 10 ppm , 40 mg/m3

ENGINEERING MEASURES :
The use of local exhaust ventilation is recommended to control emissions near the source. Laboratory samples should be handled in a fumehood. Provide mechanical ventilation of confined spaces.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section, the use of a half face filter mask or air supplied breathing apparatus is recommended. A suitable filter material depends on the amount and type of chemicals being handled. Consider the use of filter type: Organic vapor cartridge. with a Particulate pre-filter. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gauntlets is recommended., The choice of work glove depends on work conditions and what chemicals are handled, but we have positive experience under light handling conditions using gloves made from, Nitrile, Gloves should be replaced immediately if signs of degradation are observed.

SKIN PROTECTION :
When handling this product, the use of overalls, a chemical resistant apron and rubber boots is recommended. A full slicker suit is recommended if gross exposure is possible.

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EYE PROTECTION :
Wear a face shield with chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Clear Light yellow
ODOR	Amine

SPECIFIC GRAVITY	0.985 @ 60 °F / 15.6 °C
DENSITY	8.2 lb/gal
SOLUBILITY IN WATER	Complete
pH (1 %)	10.3
pH (100 %)	12
VISCOSITY	5.1 cps @ 77 °F / 25 °C
FREEZING POINT	17 °F / -8 °C
VAPOR PRESSURE	0.5 mm Hg @ 100 °F / 37.8 °C
VOC CONTENT	35.4 % EPA Method 24

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Heat and sources of ignition including static discharges. Extremes of temperature

MATERIALS TO AVOID :
Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors. Acids Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors.

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Avoid contact with SO2 or acidic bisulfite products, which may react to form visible airborne amine salt particles. Certain amines in contact with nitrous acid, organic or inorganic nitrites or atmospheres with high nitrous oxide concentrations may produce N-nitrosamines, many of which are cancer-causing agents to laboratory animals.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of nitrogen

11. TOXICOLOGICAL INFORMATION

The following results are for a similar product.

ACUTE ORAL TOXICITY :

Species	LD50	Test Descriptor
Rat	779 mg/kg	Similar Product

Rating : Harmful

ACUTE DERMAL TOXICITY :

Species	LD50	Test Descriptor
Rabbit	2,055 mg/kg	Similar Product

Rating : Non-Hazardous

ACUTE INHALATION TOXICITY :

Species	LC50	Test Descriptor
Rat	>12000 ppm (8 hrs)	Similar Product Morpholine

Rating : Non-Hazardous

PRIMARY SKIN IRRITATION :

Draize Score	Test Descriptor
8.0 / 8.0	Product

Rating : Extremely irritating (Corrosive)

PRIMARY EYE IRRITATION :

Draize Score	Test Descriptor
110 / 110.0	Product

Rating : Extremely irritating (Corrosive)

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

MUTAGENICITY :
Mutagenicity tests on morpholine provided the following results: A bacterial mutagenicity (Ames) bioassay was negative; sister chromatid exchange transformation was positive; mouse lymphoma was weakly positive and rat hepatocyte/DNA repair was negative. A mutagenicity test battery on cyclohexylamine was inconclusive. In a short-term test, cyclohexylamine caused mutation in human white blood cells.

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HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: High

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Rainbow Trout	96 hrs	130 mg/l	Product
Fathead Minnow	96 hrs	75 mg/l	Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	180 mg/l		Product

PERSISTENCY AND DEGRADATION :

Chemical Oxygen Demand (COD) : 573,000 mg/l

Biological Oxygen Demand (BOD) :

Incubation Period	Value	Test Descriptor
5 d	1,000 mg/l	

The organic portion of this preparation is expected to be readily biodegradable.

The organic portion of this preparation is expected to be readily biodegradable.

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM , provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models. If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

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ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Moderate
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: High

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Hazardous Waste: D001

Hazardous wastes must be transported by a licensed hazardous waste transporter and disposed of or treated in a properly licensed hazardous waste treatment, storage, disposal or recycling facility. Consult local, state, and federal regulations for specific requirements.

Do not reuse empty container.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name :	AMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S.
Technical Name(s) :	Morpholine, Cyclohexylamine
UN/ID No :	UN 2734
Hazard Class - Primary :	8
Hazard Class - Secondary :	3
Packing Group :	II
Flash Point :	57.2 °C / 135 °F

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name :	AMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S.
Technical Name(s) :	Morpholine, Cyclohexylamine
UN/ID No :	UN 2734
Hazard Class - Primary :	8
Hazard Class - Secondary :	3
Packing Group :	II
IATA Cargo Packing Instructions :	812
IATA Cargo Aircraft Limit :	30 L (Max net quantity per package)

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MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	AMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S.
Technical Name(s) :	Morpholine, Cyclohexylamine
UN/ID No :	UN 2734
Hazard Class - Primary :	8
Hazard Class - Secondary :	3
Packing Group :	II

15. REGULATORY INFORMATION

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Morpholine : Corrosive, Flammable
Cyclohexylamine : Corrosive, Flammable

CERCLA/SUPERFUND, 40 CFR 117, 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product contains the following substance(s) which is listed in Appendix A and B as an Extremely Hazardous Substance. Listed below are the statutory Threshold Planning Quantity (TPQ) for the substance(s) and the Reportable Quantity (RQ) of the product. If a reportable quantity of product is released, it requires notification to your State Emergency Response Commission. You may also be required to notify the National Response Center - See CERCLA/SUPERFUND, above.

Extremely Hazardous Substance	TPQ	RQ
Cyclohexylamine	10,000 lbs	40,201 lbs

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard
X	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

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Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 173.310 Boiler Water Additives

The following limitations apply:

Maximum dosage	Limitation
40 PPM	as product in the steam

This product can not be used where the steam produced will contact milk or milk products.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
None of the substances are specifically listed in the regulation.

CLEAN AIR ACT, Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
This product contains the following substances listed in the regulation:

Substance(s)	Citations
• Cyclohexylamine • Morpholine	Sec. 111

CALIFORNIA PROPOSITION 65 :
This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :
None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Water	7732-18-5
Cyclohexylamine	108-91-8
Morpholine	110-91-8

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NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
B3 - Combustible Liquids, E - Corrosive Material

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substances in this preparation are listed on the Domestic Substances List (DSL), are exempt, or have been reported in accordance with the New Substances Notification Regulations.

INTERNATIONAL CHEMICAL CONTROL LAWS

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Chemical Control Law and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Ministry of International Trade & industry List (MITI).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

MALAYSIA
This product contains substance(s) which are not in compliance with the Draft Industrial Chemicals Act and may require additional review.

NEW ZEALAND
This product complies with Parts XI - XV of the HSNO Act (1996).

THE PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippine Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's

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general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Moderate

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight# (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

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NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

NALFLEET® 2873

EMERGENCY TELEPHONE NUMBER(S)

(800) 424-9300 (24 Hours) CHEMTREC

Date issued : 05/03/2006
Version Number : 2.4

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ATTACHMENT
D-4

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NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

NALCO® 2584

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **NALCO® 2584**

APPLICATION : ALKALINITY SOURCE

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 3 / 3 FLAMMABILITY : 0 / 0 INSTABILITY : 1 / 1 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Sodium Hydroxide	1310-73-2	30.0 - 60.0
Potassium Hydroxide	1310-58-3	10.0 - 30.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

DANGER
Corrosive. May cause tissue damage.
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water.
Wear a face shield. Wear chemical resistant apron, chemical splash goggles, impervious gloves and boots.
Not flammable or combustible. Contact with reactive metals (e.g. aluminum) may result in the generation of flammable hydrogen gas.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Corrosive. Will cause eye burns and permanent tissue damage.

SKIN CONTACT :
Corrosive; causes permanent skin damage.

INGESTION :
Not a likely route of exposure. Corrosive; causes chemical burns to the mouth, throat and stomach.

INHALATION :
Not a likely route of exposure. Elevated temperatures or mechanical action may form vapors, mists or fumes which may be irritating to the eyes, nose, throat and lungs.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

HUMAN HEALTH HAZARDS - CHRONIC :
No adverse effects expected other than those mentioned above.

4. FIRST AID MEASURES

EYE CONTACT :
PROMPT ACTION IS ESSENTIAL IN CASE OF CONTACT. Immediately flush eye with water for at least 15 minutes while holding eyelids open. Get immediate medical attention.

SKIN CONTACT :
Immediately flush with plenty of water for at least 15 minutes. For a large splash, flood body under a shower. Remove contaminated clothing. Wash off affected area immediately with plenty of water. Get immediate medical attention. Contaminated clothing, shoes, and leather goods must be discarded or cleaned before re-use.

INGESTION :
DO NOT INDUCE VOMITING. If conscious, washout mouth and give water to drink. Get immediate medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Probable mucosal damage may contraindicate the use of gastric lavage. Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : None

EXTINGUISHING MEDIA :
Not expected to burn. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
Not flammable or combustible. Contact with reactive metals (e.g. aluminum) may result in the generation of flammable hydrogen gas.

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SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Stop or reduce any leaks if it is safe to do so. Ventilate spill area if possible. Ensure clean-up is conducted by trained personnel only. Do not touch spilled material. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Wash site of spillage thoroughly with water. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Do not get in eyes, on skin, on clothing. Do not take internally. Use with adequate ventilation. Do not breathe vapors/gases/dust. Keep the containers closed when not in use. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled. Do not mix with acids.

STORAGE CONDITIONS :
Store the containers tightly closed. Store separately from acids. Store in suitable labeled containers.

SUITABLE CONSTRUCTION MATERIAL :
Stainless Steel 304, Stainless Steel 316L, Hastelloy C-276, Buna-N, Nylon, Polyethylene, Polypropylene, PVC, HDPE (high density polyethylene), Plexiglass, Teflon, Alfax, Hypalon, Kalrez, Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

UNSUITABLE CONSTRUCTION MATERIAL :
Aluminum, Mild steel, Natural rubber, Brass, Copper, Ethylene propylene, Neoprene, Polyurethane, Viton

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

ACGIH/TLV :

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Substance(s)

Sodium Hydroxide	CEILING: 2 mg/m3
Potassium Hydroxide	CEILING: 2 mg/m3

OSHA/PEL :

Substance(s)

Sodium Hydroxide	CEILING: 2 mg/m3
Potassium Hydroxide	CEILING: 2 mg/m3

ENGINEERING MEASURES :
The use of local exhaust ventilation is recommended to control emissions near the source. Laboratory samples should be handled in a fumehood. Provide mechanical ventilation of confined spaces.

RESPIRATORY PROTECTION :
Where concentrations in air may exceed the limits given in this section, the use of a half face filter mask or air supplied breathing apparatus is recommended. A suitable filter material depends on the amount and type of chemicals being handled. Consider the use of filter type: Particulate filter - HEPA. with a Particulate pre-filter. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gauntlets is recommended., The choice of work glove depends on work conditions and what chemicals are handled, but we have positive experience under light handling conditions using gloves made from, PVC, Gloves should be replaced immediately if signs of degradation are observed., Breakthrough time not determined as preparation, consult PPE manufacturers.

SKIN PROTECTION :
Wear chemical resistant apron, chemical splash goggles, impervious gloves and boots. A full slicker suit is recommended if gross exposure is possible.

EYE PROTECTION :
Wear a face shield with chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE Liquid

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APPEARANCE	Colorless
ODOR	None
SPECIFIC GRAVITY	1.50 - 1.53 @ 60 °F / 15.6 °C
DENSITY	12.5 - 12.7 lb/gal
SOLUBILITY IN WATER	Complete
pH (5 %)	14
FREEZING POINT	-10 °F / -23 °C
BOILING POINT	293 °F / 145 °C
VAPOR PRESSURE	0.5 mm Hg @ 100 °F / 37.7 °C
VOC CONTENT	0 % Calculated

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Extremes of temperature

MATERIALS TO AVOID :
Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors. Gives off hydrogen by reaction with metals.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: None known

11. TOXICOLOGICAL INFORMATION

The following results are for the hazardous components.

ACUTE ORAL TOXICITY :

Species	LD50	Test Descriptor
Rat	205 mg/kg	Potassium Hydroxide

Rating : Toxic

ACUTE DERMAL TOXICITY :

Species	LD50	Test Descriptor
Rabbit	1,260 mg/kg	Potassium Hydroxide

Rating : Non-Hazardous

US EPA ARCHIVE DOCUMENT

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: High

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for a similar product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Fathead Minnow	96 hrs	102 mg/l	Similar Product

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	180 mg/l		Similar Product

PERSISTENCY AND DEGRADATION :

Biological Oxygen Demand (BOD) :

Incubation Period	Value	Test Descriptor
5 d	0 mg/l	Product

The product does not contain any organic substances.

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM , provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models. If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

US EPA ARCHIVE DOCUMENT

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Low

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Hazardous Waste: D002

Hazardous wastes must be transported by a licensed hazardous waste transporter and disposed of or treated in a properly licensed hazardous waste treatment, storage, disposal or recycling facility. Consult local, state, and federal regulations for specific requirements.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name :	CAUSTIC ALKALI LIQUID, N.O.S.
Technical Name(s) :	SODIUM HYDROXIDE, POTASSIUM HYDROXIDE
UN/ID No :	UN 1719
Hazard Class - Primary :	8
Packing Group :	II
Flash Point :	None
DOT Reportable Quantity (per package) :	3,000 lbs
DOT RQ Component :	SODIUM HYDROXIDE

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name :	CAUSTIC ALKALI LIQUID, N.O.S.
Technical Name(s) :	SODIUM HYDROXIDE, POTASSIUM HYDROXIDE
UN/ID No :	UN 1719
Hazard Class - Primary :	8
Packing Group :	II
IATA Cargo Packing Instructions :	813
IATA Cargo Aircraft Limit :	30 L (Max net quantity per package)

US EPA ARCHIVE DOCUMENT

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	CAUSTIC ALKALI LIQUID, N.O.S.
Technical Name(s) :	SODIUM HYDROXIDE, POTASSIUM HYDROXIDE
UN/ID No :	UN 1719
Hazard Class - Primary :	8
Packing Group :	II

15. REGULATORY INFORMATION

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Sodium Hydroxide : Corrosive
Potassium Hydroxide : Corrosive

CERCLA/SUPERFUND, 40 CFR 117, 302 :
This product contains the following Reportable Quantity (RQ) Substance. Also listed is the RQ for the product. If a reportable quantity of product is released, it requires notification to the NATIONAL RESPONSE CENTER, WASHINGTON, D.C. (1-800-424-8802).

RQ Substance	RQ
Sodium Hydroxide	3,000 lbs

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard
-	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

US EPA ARCHIVE DOCUMENT

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 173.310 Boiler Water Additives

Limitations: no more than required to produce intended technical effect.

This product has been certified as KOSHER/PAREVE for year-round use INCLUDING THE PASSOVER SEASON by the CHICAGO RABBINICAL COUNCIL.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
This product contains the following substances listed in the regulation:

Substance(s)	Citations
• Sodium Hydroxide • Potassium Hydroxide	Sec. 311

CLEAN AIR ACT, Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
None of the substances are specifically listed in the regulation.

CALIFORNIA PROPOSITION 65 :
This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :
None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Potassium Hydroxide	1310-58-3
Sodium Hydroxide	1310-73-2

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
E - Corrosive Material

US EPA ARCHIVE DOCUMENT

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

INTERNATIONAL CHEMICAL CONTROL LAWS

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

EUROPE
The substance(s) in this preparation are included in or exempted from the EINECS or ELINCS inventories

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Ministry of International Trade & industry List (MITI).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

THE PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippine Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

US EPA ARCHIVE DOCUMENT

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight# (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 02/12/2007
Version Number : 1.8

US EPA ARCHIVE DOCUMENT

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ATTACHMENT E

US EPA ARCHIVE DOCUMENT

INTER-ORGANIZATION CORRESPONDENCE

MANITOWOC PUBLIC UTILITIES

TO: RED JONES
MARK KLEIN
ANDY ONESTI

DATE: 10/14/2008

FROM: DALE KOCH

SUBJECT: CARFERRY COAL

In accordance with a verbal agreement between MPU & LMC for coal supply to the carferry during the 2008 season, the following should be billed to LMC for coal supplied from September 1 through October 12 , 2008

2008 FUEL: BLENDED EAST KENTUCKY STOKER and UTAH WESTRIDGE COAL

	COST	TONS	TOTAL
PRICE PER TON STOKER FUEL	$[redacted]	[redacted]	$[redacted]
MOVE FUEL	$[redacted]		$[redacted]
FUEL SURCHARGE	$[redacted]		$[redacted]
PRICE PER TON BLENDED FUEL	$[redacted]	[redacted]	$[redacted]
DOCK CHARGE/TON	$[redacted]	[redacted]	$[redacted]
FUEL CARRING COST/TN	$[redacted]	[redacted]	$[redacted]
MPU LABOR COSTS/ HOURS	$[redacted]	[redacted]	$[redacted]
DUE MPU			$[redacted]

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INTER-ORGANIZATION CORRESPONDENCE

MANITOWOC PUBLIC UTILITIES

TO: **RED JONES**
MARK KLEIN
ANDY ONESTI

DATE: **9/5/2008**

FROM: **DALE KOCH**

SUBJECT: **CARFERRY COAL**

In accordance with a verbal agreement between MPU & LMC for coal supply to the carferry during the 2008 season, the following should be billed to LMC for coal supplied from August 1 through August 31, 2008

2008 FUEL: BLENDED EAST KENTUCKY STOKER and UTAH WESTRIDGE COAL

	COST	TONS	TOTAL
PRICE PER TON	$[redacted]	[redacted]	$[redacted]
DOCK CHARGE/TON	$[redacted]	[redacted]	$[redacted]
FUEL CARRING COST/TN	$[redacted]	[redacted]	$[redacted]
MPU LABOR COSTS/ HOURS	$[redacted]	[redacted]	$[redacted]
DUE MPU			$[redacted]

CBI

INTER-ORGANIZATION CORRESPONDENCE

MANITOWOC PUBLIC UTILITIES

TO: **RED JONES** **DATE:** **8/7/2008**
MARK KLEIN
ANDY ONESTI
FROM: **DALE KOCH**

SUBJECT: **CARFERRY COAL**

In accordance with a verbal agreement between MPU & LMC for coal supply to the carferry during the 2008 season, the following should be billed to LMC for coal supplied from July 1 through July 31, 2008

2008 FUEL: BLENDED EAST KENTUCKY STOKER and UTAH WESTRIDGE COAL

	COST	TONS	TOTAL
PRICE PER TON	$[redacted]	[redacted]	$[redacted]
DOCK CHARGE/TON	$[redacted]	[redacted]	$[redacted]
FUEL CARRING COST/TN	$[redacted]	[redacted]	$[redacted]
MPU LABOR COSTS/ HOURS	$[redacted]	[redacted]	$[redacted]
DUE MPU			$[redacted]

CBI

LMCF00287

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INTER-ORGANIZATION CORRESPONDENCE

MANITOWOC PUBLIC UTILITIES

TO: **RED JONES**
MARK KLEIN
ANDY ONESTI

DATE: **7/1/2008**

FROM: **DALE KOCH**

SUBJECT: **CARFERRY COAL**

In accordance with a verbal agreement between MPU & LMC for coal supply to the carferry during the 2008 season, the following should be billed to LMC for coal supplied from June 1st through June 30th, 2008

2008 FUEL: BLENDED EAST KENTUCKY STOKER and UTAH WESTRIDGE COAL

	COST	TONS	TOTAL
PRICE PER TON	$[redacted]	[redacted]	$[redacted]
DOCK CHARGE/TON	$[redacted]	[redacted]	$[redacted]
FUEL CARRING COST/TN	$[redacted]	[redacted]	$[redacted]
MPU LABOR COSTS/ HOURS	$[redacted]	[redacted]	$[redacted]
DUE MPU			$[redacted]

CBI

INTER-ORGANIZATION CORRESPONDENCE

MANITOWOC PUBLIC UTILITIES

TO: **RED JONES** **DATE:** **6/10/2008**
MARK KLEIN
ANDY ONESTI
FROM: **DALE KOCH**

SUBJECT: **CARFERRY COAL**

In accordance with a verbal agreement between MPU & LMC for coal supply to the carferry during the 2008 season, the following should be billed to LMC for coal supplied from May 9th through May 31st, 2008

2008 FUEL: BLENDED EAST KENTUCKY STOKER and UTAH WESTRIDGE COAL

	COST	TONS	TOTAL
PRICE PER TON	$[redacted]	[redacted]	$[redacted]
DOCK CHARGE/TON	$[redacted]	[redacted]	$[redacted]
FUEL CARRING COST/TN	$[redacted]	[redacted]	$[redacted]
MPU LABOR COSTS/ HOURS	$[redacted]	[redacted]	$[redacted]
DUE MPU			$[redacted]

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US EPA ARCHIVE DOCUMENT

INVOICE

MANITOWOC PUBLIC UTILITIES
1303 S 8TH STREET
PO BOX 1090
MANITOWOC WI 54221-1090

Please Call Invoice Questions (920)-686-4381

Invoice Number: S0016399
Invoice Date: 10-JUN-2008
Account Number: 900000174
Document (Ref) Number: -
Date Due: 10-JUL-2008

Sold To:

LAKE MICHIGAN CARFERRY SERVICE
PO BOX 708
LUDINGTON, MI 49431-0708

AMOUNT: [redacted]

S0016399 0118960.50

Please return upper portion with your check payable to Manitowoc Public Utility

Tran Date	Quantity	Description	Rate	Amount
		- CURRENT CHARGES -		
		COAL SUPPLIED FROM		
		MAY 9 THROUGH MAY 31, 2008.		
		SEE ATTACHED DETAIL		
		==========		
31-MAY-2008		Sale-Coal & Dock Chg-Carferry		[redacted]
		* TOTAL INVOICE BALANCE *		[redacted]

INVOICE/ACCOUNT NUMBER: S0016399 / 900000174 MANITOWOC PUBLIC UTILITIES

INTER-ORGANIZATION CORRESPONDENCE

MANITOWOC PUBLIC UTILITIES

TO: **RED JONES**
MARK KLEIN
ANDY ONESTI
FROM: **DALE KOCH**

DATE: **6/10/2008**

SUBJECT: **CARFERRY COAL**

In accordance with a verbal agreement between MPU & LMC for coal supply to the carferry during the 2008 season, the following should be billed to LMC for coal supplied from May 9th through May 31st, 2008

2008 FUEL: BLENDED EAST KENTUCKY STOKER and UTAH WESTRIDGE COAL

	COST	TONS	TOTAL
PRICE PER TON	$[redacted]	[redacted]	$[redacted]
DOCK CHARGE/TON	$[redacted]	[redacted]	$[redacted]
FUEL CARRING COST/TN	$[redacted]	[redacted]	$[redacted]
MPU LABOR COSTS/ HOURS	$[redacted]	[redacted]	$[redacted]
DUE MPU			$[redacted]

[redacted]

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LMCF00290

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ATTACHMENT F

MINNESOTA VALLEY TESTING LABORATORIES, INC.
1126 N. Front St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890
1411 S. 12th St. ~ Bismarck, ND 58502 ~ 800-279-6885 ~ Fax 701-258-9724
35 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
www.mvtl.com

MEMBER ACIL

FINAL ANALYSIS REPORT

Report Date: 1 Dec 2006

Lab Number: 06-H493
Work Order #: 81-1272

James Anderson
Lake Michigan Carferry
PO Box 708
Ludington MI 49431

Date Received: 31 Oct 2006
Time Received: 10:00

SW846 Method 1311

TCLP Date Ext: 11/ 9/06

Sample Description: Bottom Ash

Analyte	Result		Action Level		Date Analyzed
% Solids (dry)	100	wt %	N/A		11/ 9/06
% Solids (wet)	100	wt %	N/A		11/ 9/06
Arsenic TCLP	< 0.04	mg/l	5.0	mg/l	11/27/06
Barium TCLP	0.50	mg/l	100	mg/l	11/28/06
Cadmium TCLP	< 0.01	mg/l	1.0	mg/l	11/28/06
Chromium TCLP	< 0.05	mg/l	5.0	mg/l	11/28/06
Lead TCLP	< 0.5	mg/l	5.0	mg/l	11/28/06
Mercury TCLP	< 0.01	mg/l	0.2	mg/l	11/16/06
Reactive Cyanides	< 0.5	mg/kg		mg/l	11/10/06
Reactive Sulfides	336.0	mg/kg		mg/l	11/10/06
Selenium TCLP	< 0.04	mg/l	1.0	mg/l	11/27/06
Silver TCLP	< 0.2	mg/l	5.0	mg/l	11/27/06
TCLP pH	5.21	units	N/A		11/ 9/06
TCLP Semi-Volatiles	See Attached Report		N/A		12/ 1/06
TCLP VOC	See Attached Report		N/A		12/ 1/06

Approved By: C. Carlson

MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

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www.mvtl.com

MEMBER ACIL

FINAL ANALYSIS REPORT

Report Date: 1 Dec 2006

Lab Number: 06-H494
Work Order #: 81-1272

James Anderson
Lake Michigan Carferry
PO Box 708
Ludington MI 49431

Date Received: 31 Oct 2006
Time Received: 10:00

SW846 Method 1311

TCLP Date Ext: 11/ 9/06

Sample Description: Fly Ash

Analyte	Result		Action Level		Date Analyzed
% Solids (dry)	100	wt %	N/A		11/ 9/06
% Solids (wet)	100	wt %	N/A		11/ 9/06
Arsenic TCLP	< 0.04	mg/l	5.0	mg/l	11/27/06
Barium TCLP	0.52	mg/l	100	mg/l	11/28/06
Cadmium TCLP	< 0.01	mg/l	1.0	mg/l	11/28/06
Chlorine	555	ug/g		mg/l	11/29/06
Chromium TCLP	< 0.05	mg/l	5.0	mg/l	11/28/06
Copper TCLP	0.07	mg/l		mg/l	11/28/06
Density	0.364	g/cm3		mg/l	11/29/06
Lead TCLP	< 0.5	mg/l	5.0	mg/l	11/28/06
Mercury TCLP	< 0.01	mg/l	0.2	mg/l	11/16/06
Nickel TCLP	0.21	mg/l		mg/l	11/28/06
Paint Filt. Liqds Test	No Free Liquids		N/A		11/29/06
pH-Environmental	8.6	units	N/A		11/29/06
Selenium TCLP	0.041	mg/l	1.0	mg/l	11/27/06
Setaflash Flashpoint	> 400	degrees F		mg/l	11/ 9/06
Silver TCLP	< 0.2	mg/l	5.0	mg/l	11/27/06
TCLP pH	5.01	units	N/A		11/ 9/06
TCLP Semi-Volatiles	See Attached Report		N/A		12/ 1/06
TCLP VOC	See Attached Report		N/A		12/ 1/06
Total Solids	976000	ug/g	N/A		11/16/06
Zinc TCLP	0.73	mg/l		mg/l	11/28/06

Approved By:

MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

US EPA ARCHIVE DOCUMENT

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35 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
www.mvtl.com

Report Date: 1 Dec 06
Lab Number: 06-T144
Work Order: 81-1272
Account #:
Sample Matrix: TCLP
Date Sampled:
Sampled By:
Date Received: 10 Nov 06

JAMES ANDERSON LAKE MICHIGAN CARFERRY
PO BOX 708
LUDINGTON MI 49431

Sample Description: BOTTOM ASH
H493

Temp at Receipt: 4.0 C

	CAS #	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst

NITROBENZENE (SURROGATE) RECOVERY: 85 %
2-FLUOROBIPHENYL (SURROGATE) RECOVERY: 77 %
TERPHENYL-d14 (SURROGATE) RECOVERY: 62 %

2-FLUOROPHENOL (SURROGATE) RECOVERY: 62 %
PHENOL-d5 (SURROGATE) RECOVERY: 41 %
2,4,6-TRIBROMOPHENOL (SURROGATE) RECOVERY: 87 %

DIBROMOFLUOROMETHANE (SURROGATE) RECOVERY: 99 %
TOLUENE-d8 (SURROGATE) RECOVERY: 97 %
4-BROMOFLUOROBENZENE (SURROGATE) RECOVERY: 95 %

Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix # = Due to sample concentration
! = Due to sample quantity + = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

US EPA ARCHIVE DOCUMENT

MINNESOTA VALLEY TESTING LABORATORIES, INC.
1126 N. Front St. ~ New Ulm, MN 56073 ~ 800-782-3557 ~ Fax 507-359-2890
1411 S. 12th St. ~ Bismarck, ND 58502 ~ 800-279-6885 ~ Fax 701-258-9724
35 W. Lincoln Way ~ Nevada, IA 50201 ~ 800-362-0855 ~ Fax 515-382-3885
www.mvtl.com
MEMBER ACIL

Report Date: 1 Dec 06
Lab Number: 06-T144
Work Order #:81-1272
Account #:
Sample Matrix: TCLP
Date Sampled:
Date Received: 10 Nov 06

JAMES ANDERSON LAKE MICHIGAN CARFERRY
PO BOX 708
LUDINGTON MI 49431

Sample Description: BOTTOM ASH H493

SW846 Method 1311
SW846 - 8260
SW846 - 8270

TCLP Ext: 9 Nov 2006
ZHE Ext: 14 Nov 2006
SVol Ext: 16 Nov 2006

Analyte	Result		Action Level - mg/L	Date Analyzed
Benzene	< 0.0800	mg/L	0.500	11/27/06
Carbon Tetrachloride	< 0.0800	mg/L	0.500	11/27/06
Chlorobenzene	< 0.0800	mg/L	100	11/27/06
Chloroform	< 0.100	mg/L	6.00	11/27/06
1,2-Dichloroethane	< 0.100	mg/L	0.500	11/27/06
1,1-Dichloroethylene	< 0.100	mg/L	0.700	11/27/06
Methyl Ethyl Ketone	< 0.800	mg/L	200	11/27/06
1,1,2,2-Tetrachloroethylene	< 0.0800	mg/L	0.700	11/27/06
1,1,2-Trichloroethylene	< 0.120	mg/L	0.500	11/27/06
Vinyl Chloride	< 0.120	mg/L	0.200	11/27/06
resol	< 0.0540	mg/L	200	11/28/06
entachlorophenol	< 0.0550	mg/L	100	11/28/06
1,4-Dichlorobenzene	< 0.0130	mg/L	7.5	11/28/06
2,4-Dinitrotoluene	< 0.0380	mg/L	0.13 *	11/28/06
Hexachlorobenzene	< 0.0180	mg/L	0.13 *	11/28/06
Hexachloro-1,3-Butadiene	< 0.0150	mg/L	0.5	11/28/06
Hexachloroethane	< 0.0130	mg/L	3	11/28/06
Nitrobenzene	< 0.0150	mg/L	2	11/28/06
Pyridine	< 0.0550	mg/L	5 *	11/28/06
2,4,5-Trichlorophenol	< 0.0150	mg/L	400	11/28/06
2,4,6-Trichlorophenol	< 0.0150	mg/L	2	11/28/06

* If the quantitation limit is greater than the calculated regulatory level, the quantitation limit therefore becomes the regulatory level.

2-FLUOROPHENOL (SURROGATE) RECOVERY: 62 %
PHENOL-d5 (SURROGATE) RECOVERY: 41 %
2,4,6-TRIBROMOPHENOL (SURROGATE) RECOVERY: 87 %
NITROBENZENE (SURROGATE) RECOVERY: 85 %
2-FLUOROBIPHENYL (SURROGATE) RECOVERY: 77 %
TERPHENYL-d14 (SURROGATE) RECOVERY: 62 %
DIBROMOFLUOROMETHANE (SURROGATE) RECOVERY: 99 %
TOLUENE-d8 (SURROGATE) RECOVERY: 97 %
4-BROMOFLUOROBENZENE (SURROGATE) RECOVERY: 95 %

Approved by: R. Dan O'Connell

Dan O'Connell, Organic
Laboratory Manager New Ulm, MN

MVTL guarantees the accuracy of the analysis done on the sample submitted for testing. It is not possible for MVTL to guarantee that a test result obtained on a particular sample will be the same on any other sample unless all conditions affecting the sample are the same, including sampling by MVTL. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

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Report Date: 1 Dec 06
Lab Number: 06-T145
Work Order: 81-1272
Account #:
Sample Matrix: TCLP
Date Sampled:
Sampled By:
Date Received: 10 Nov 06

JAMES ANDERSON LAKE MICHIGAN CARFERRY
PO BOX 708
LUDINGTON MI 49431

Sample Description: FLY ASH
H494

Temp at Receipt: 4.0 C

	CAS #	As Received Result	Method RL	Method Reference	Date Analyzed	Analyst

NITROBENZENE (SURROGATE) RECOVERY: 92 %
2-FLUOROBIPHENYL (SURROGATE) RECOVERY: 87 %
TERPHENYL-d14 (SURROGATE) RECOVERY: 80 %

2-FLUOROPHENOL (SURROGATE) RECOVERY: 53 %
PHENOL-d5 (SURROGATE) RECOVERY: 37 %
2,4,6-TRIBROMOPHENOL (SURROGATE) RECOVERY: 111 %

DIBROMOFLUOROMETHANE (SURROGATE) RECOVERY: 99 %
TOLUENE-d8 (SURROGATE) RECOVERY: 98 %
4-BROMOFLUOROBENZENE (SURROGATE) RECOVERY: 94 %

= Reporting Limit

Elevated "Less Than Result" (<): @ = Due to sample matrix
! = Due to sample quantity
= Due to sample concentration
+ = Due to extract volume

CERTIFICATION: MN LAB # 027-015-125 WI LAB # 999447680 ND MICRO # 1013-M ND WW/DW # R-040 IA LAB #: 132 IA LAB #: 022

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JAMES ANDERSON LAKE MICHIGAN CARFERRY
PO BOX 708
LUDINGTON MI 49431

Sample Description: FLY ASH H494

SW846 Method 1311
SW846 - 8260
SW846 - 8270

TCLP Ext: 9 Nov 2006
ZHE Ext: 14 Nov 2006
SVol Ext: 16 Nov 2006

Analyte	Result	Action Level - mg/L	Date Analyzed
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Hexachloroethane	< 0.0130 mg/L	3	11/28/06
Nitrobenzene	< 0.0150 mg/L	2	11/28/06
Pyridine	< 0.0550 mg/L	5 *	11/28/06
2,4,5-Trichlorophenol	< 0.0150 mg/L	400	11/28/06
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