



Allen
3178.345-9
Cargo Tanks
02-0017

November 30, 2001

Mr. Thomas Allen
DOT RSPA/ OHMS
400 Seventh Street, Rm. 8422
Washington, DC 20590-0001

Dear Mr. Allen:

The last time we talked, you told me your time was being consumed with the September 11th events, understandably so. You also mentioned briefly about the comparison of the auger tanker seals to the conventional seals on most tank truck valves and flanges, etc. Due to the recent events and your altered schedule, we also decided we would discuss these issues later. I have given the seal comparison a lot of thought and from my personal experience, in the design and operation of seals which are submerged in hazardous waste solvents containing abrasive solids, I have found the following: In our design, our seals are submerged and contained within the walls of the vessel. We did this so we did not violate the shell with a rotating shaft. However, we still have a seal facing this harsh environment on a rotating shaft. However, since it is within the tank walls, it does not pose a spill concern. The containment for these motors and seals is imperative, since the seals' life is generally about one year. Some of the seals we have used are viton, teflon, chemrez, calrez, and hard surface to hard surface mechanical seals with an oil flush. What all of these seals have in common is they will all eventually fail.

In our last conversation, the augers' seal, which is a rotary shaft seal, located in the same hazardous environment, was being compared to a typical flange gasket, or a valve gasket seal by a few of your colleagues. This type of seal will probably never experience failure since it is a "static" seal, meaning it has no movement to cause wear. If the proper gaskets are used in application, they generally are not changed until the valve, or port is removed for inspection or re-building. However, if this type of seal does leak, it would generally give plenty of warning, usually with a drip or a damp spot. I have never heard of a complete instant failure of this type seal. Therefore, these static seals are probably close to being as safe as the vessel itself.

On the other hand, a rotating shaft seal is very different. Since there is continuous movement involved, there is continuous wear involved. This is evident because all shaft seals, no matter what the application, eventually fail. Not only do they fail, but also they generally do not give any warning. One minute, there is a secure seal, and the next, they can be pouring. We have experienced this time and time again with our specialty seals in this same environment. Since the auger design has at least two rotating shaft seals in which either one can leak to the

November 30, 2001

outside of the vessel, the chances of seal failure are increased. From personally seeing several of these units in operation, it is obvious that they are failing and leaking due to the waste material and dirt that is caked around the shaft entry point on the vessel. This can also be seen in the pictures I sent you, as in our original inquiry, dated, June 28, 2000, from Dave Fellows, a design certified engineer. He also feels that this rotating shaft seal is not as impervious and safe as the vessel material itself. Ref. DOT # 178.345-9(H).

I also wanted to make sure the lack of crash protection around the shaft seal and motor combination appears to be a problem as well. There is no crash protection around the drive unit, which protrudes at least 18" off the center of the front, and sometimes rear tanker head. (Ref. Picture enclosed, pg. 44). You will also notice in the picture, that the manhole assembly does not have any crash protection or framerrails extending beyond it either. One slight hit in a rollover, and the whole assembly would be knocked off leaving a 3" to 4" hole. Even in a situation where the fifth wheel latch fails, or was not properly locked with the landing gear in the up position, could result in the manhole or the motor assembly being dislodged.

I wanted to write you to stress these two issues before you make a final determination. I would welcome any conversation on any feedback you may have. It has been one year, five months, since our first inquiry on this subject and we still need a written opinion from DOT as to whether this design meets your approval to haul hazardous materials and hazardous waste. Thank you very much for the time and work you have put into this inquiry. I look forward to your response at your earliest convenience.

Yours very truly,



Robert Rumph

RR/sm



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Yours very truly,



Robert Rumph

RR/sm



maitland
THE MAITLAND COMPANY

Memorandum

To: Thomas Allen
DOTRSPA/OHMS

From: Robert Rumph

Date: 12/20/01

Re: SEAL PROBLEM

As I have mentioned, we see these trailers at various cement kiln and truck stops around the Country. One of our drivers just saw one such trailer in Arkansas. He saw this unit everyday for two weeks at their unloading destination. According to our driver, and as you can see in the pictures, this unit was leaking from the seal assembly, as well as, the manhole located below. According to our driver, the unit was leaving a puddle on the ground everyday while it was waiting to be off-loaded. Also, according to our driver and from looking at the pictures as well, it appears that the inner shaft seal is not leaking. However, the outer auger swing shaft seal is leaking, which is one of the two seals in this design that can fail.

Also, note there is no crash protection around the bottom manway. If this trailer was detached from the tractor loaded, and the driver was to forget to crank down the landing gear, the truck frame would hit the manhole as it slid off the truck. It is common for these trucks in this industry to be drop loaded. I wanted to send you these pictures, since the last ones were not clear. This particular unit, as is common for other trucks in this industry, was hauling placarded material 1993, hazardous waste flammable liquids.

Thank you for your help on this matter. I will be looking forward to your department's response as soon as possible.



March 22, 2001

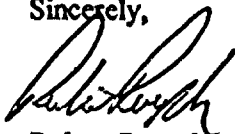
Mr. Tom Allen
Office Of Hazardous Materials
DHM-10
C/O U.S. Department of Transportation
Washington, DC 20590

Dear Mr. Allen:

Please find enclosed, pictures of the Proco (manufacturer) auger trailer that we have been discussing. The terminal manager at A.R. Paquette & Company took these pictures. Please note that if you look at the pictures around the seal assembly, you will see where the seals have been leaking. Mr. Paquette told me that the seals around the unprotected manhole are also leaking. He told me that if you look closely at the picture of the manhole lid, you can see where the shaft seal has been leaking waste product and running across the manhole. The driver that pulls the unit for this company (Hubcity) also said that seal failures and leaks around the shaft are a common occurrence. The majority of these units are hauling flammable hazardous waste solvent slurry.

I hope these pictures and information are of help to you and your staff in better understanding how these units are built.

Sincerely,



Robert Rumph

Enclosures

A.R. PAQUETTE & CO., INC.

**1827 Latham
Memphis, TN. 38106**

**901-942-6806
800-490-2615
FAX 901-942-6730**

**To: Mr. Robert Rumph
From: Chris Paquette
Subject: Auger Tankers**


March 12, 2001

Robert,

On Friday March 9, 2001 I had a Hub City driver at my facility looking for a job. I had noticed that he was pulling a "Auger" tanker. I took this opportunity to look this tanker over, simply because I have never seen one up close.

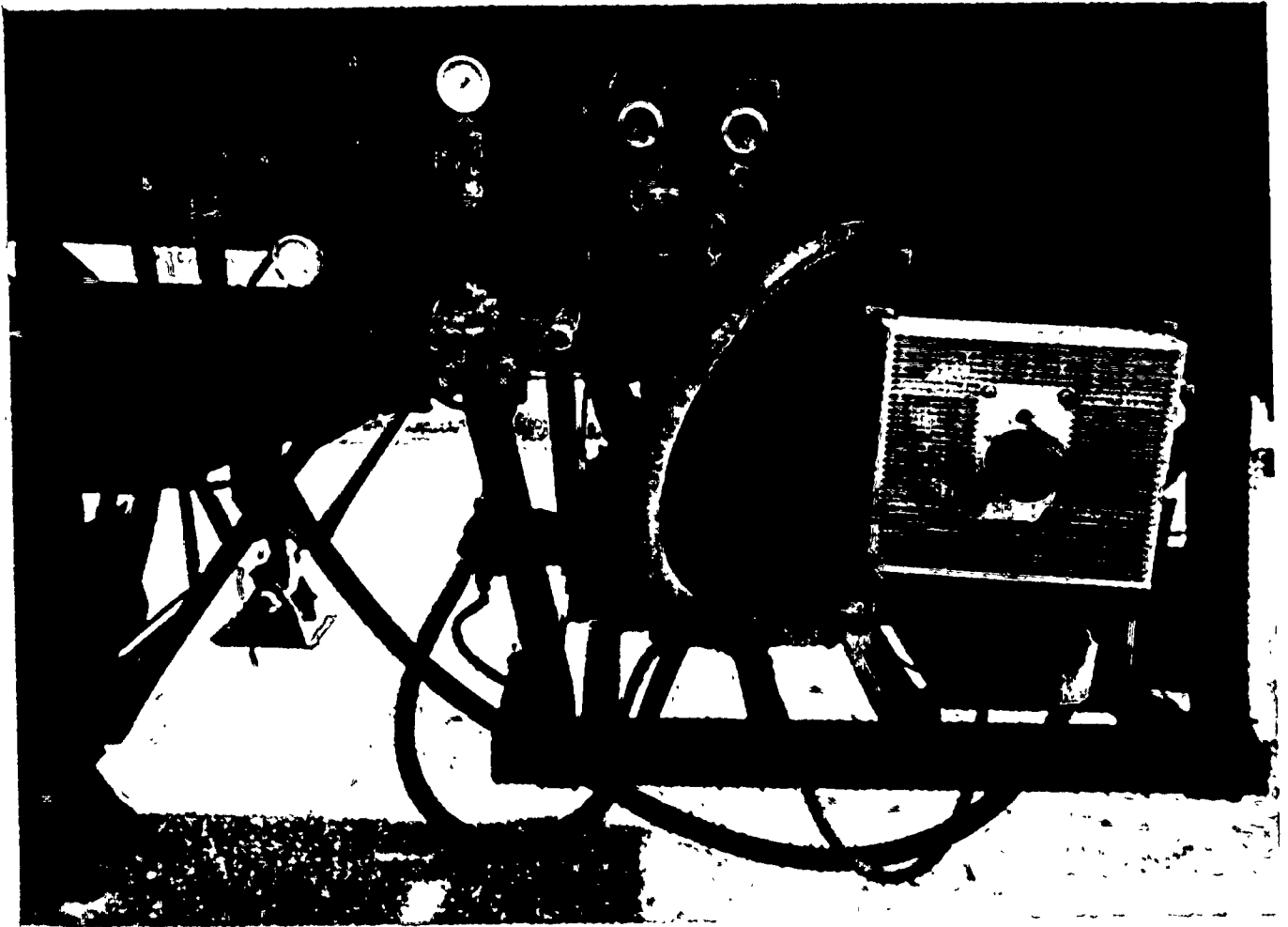
Per your request we have taken some pictures of this unique piece of equipment and if you look where the shaft of the hydraulic motor penetrates the shell of the tanker, I think you will be surprised.

If you have any further questions please feel free to contact me.

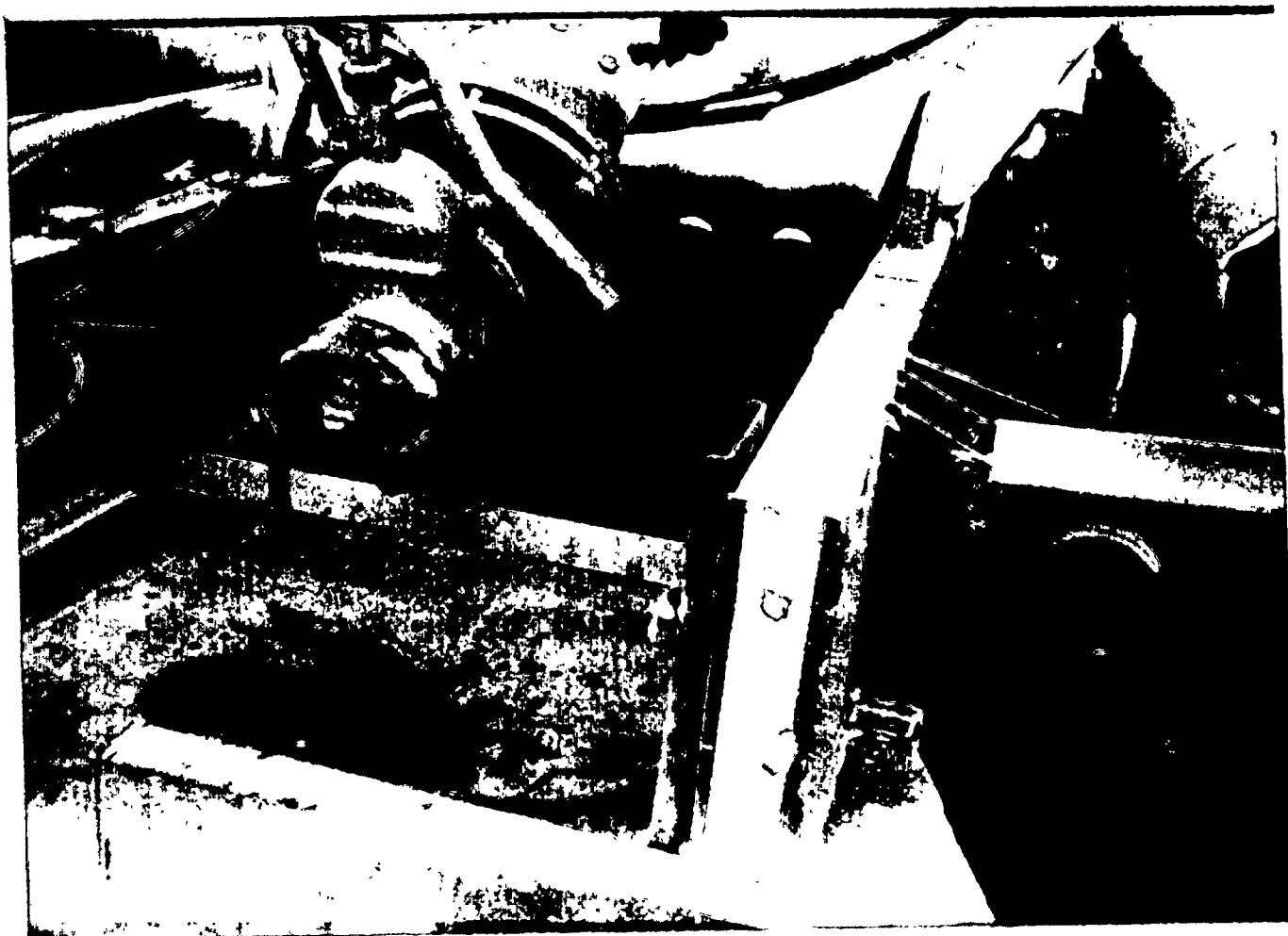
**Sincerely,

Chris Paquette
A.R. Paquette & Co.
Operations Manager
Memphis Div.**

picture #1 shaft penetrating
w/ a leak
#2 same as #1
#3 Front access cover and
neath the shaft seal leak
#4 hyd pump shaft penetrat
tanker notil leaked onto
access cover

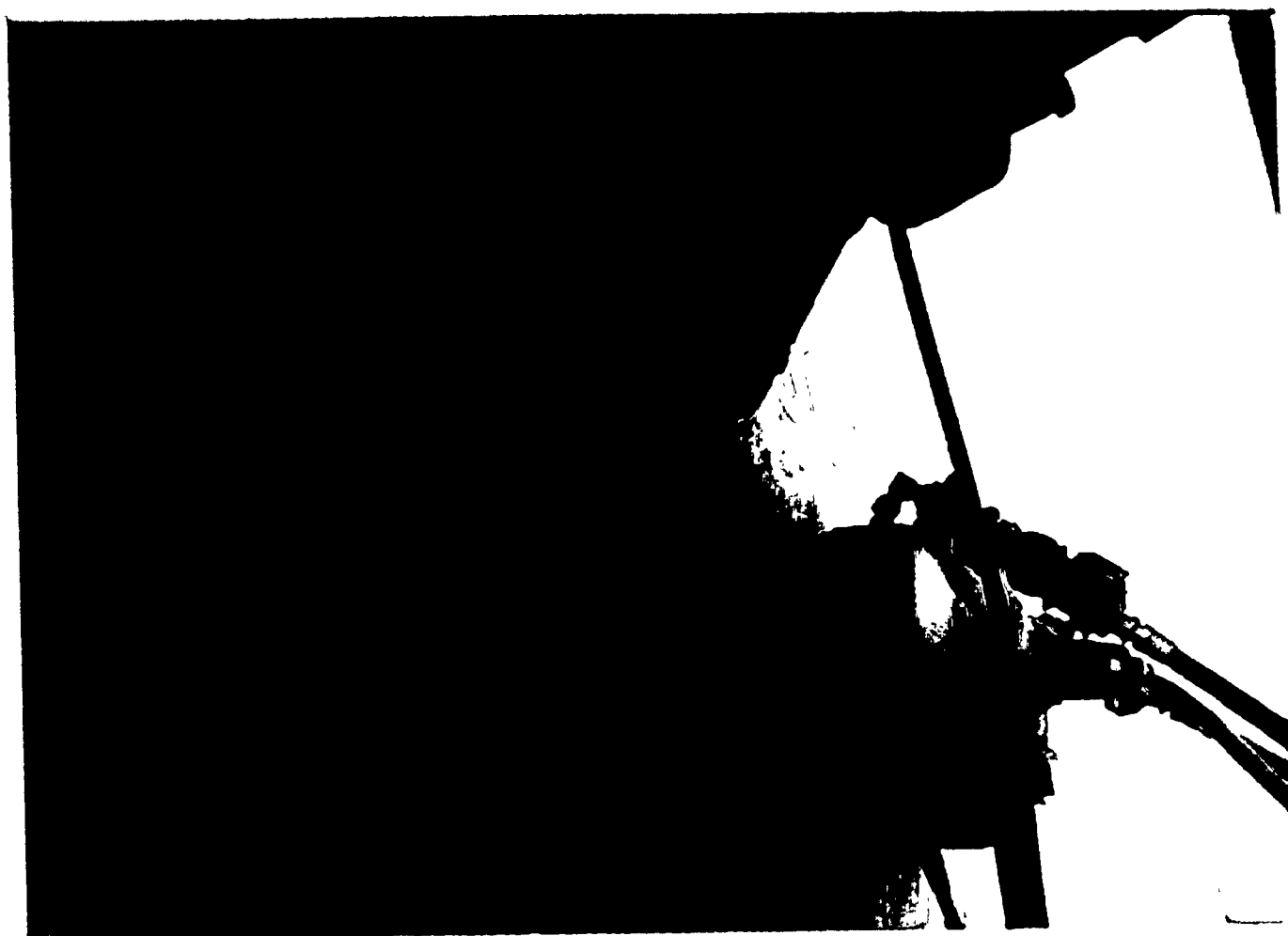
Robert,
This is the
memo from Chris
Pogorelec that came
with the pictures.













Allan, Thomas

From: Noel McKim [nmckim@swbell.net]
Sent: Thursday, July 11, 2002 3:00 PM
To: THOMAS.ALLAN@RSPA.DOT.GOV
Subject: MAINTENANCE ALERT

Attn Mr. Steve Hurst

In response to our conversation I am submitting the following warning for the service advisory you requested.

We request the following service advisory be added to the operates manual for the Proco Auger Trailer you company purchased, and that all personal trained to operate or service the equipment be made aware of the Advisory.

The packing gland at the front and rear of the auger trailer must be checked for leaks before transporting any hazardous material, as well as any time the drivers walks around the vehicle for DOT inspections. If a leak is found it may remedied by simply tightening the bolts holding the packing gland. As the packing gland gets within an 1/8" of an inch of bottoming out the Teflon packing must be replaced.

The enclosed decal must be attached below packing gland at front and rear of all trailers.

Check packing before
transporting each load

Replace packing when
gland reaches 1/8" of
Bottoming out.

Sincerely
Noel McKim
Vice President of Engineering

UNITED STATES DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

US DOT #: 0512390		LEGAL: KAYWAL TRANSPORTATION INC								
REVIEW TYPE: CR		OPERATING:								
STATUS: Update		PHYSICAL ADDRESS: 701 SOUTH I-45								
PLACE:		(County Code: 113) HUTCHINS, TX 75141								
Principal office		MAILING ADDRESS: PO BOX 10								
CENSUS TYPE:		(County Code: 113) WILMER, TX 75172								
Carrier		IOC #: MC-261317				PHONE #:				
BUSINESS:		FEDERAL TAX ID #: 752467218 (EIN)				VOICE (214)225-8684				
Corporation						FAX (214)225-8886				
CARRIER OPERATION: Interstate - HM						REGION OIC TERRITORY				
SHIPPER OPERATION: N/A						06 48 01				
CLASS: (A) Authorized										
CARGO CLASSIFICATION: (A, L) General Freight; Intermodal										
HAZARDOUS MATERIALS (C-CARRIED S-SHIPPED T-TANKS P-PACKAGES)										
D. Division 1.4 C P										
EQUIPMENT:										
	TRUCK			HM TANK		HM TANK		MOTOR	SCHOOL	PASS.
	TRUCKS	TRACTORS	TRAILERS	TRAILERS	TRUCKS	COACH	BUS	LIMO	VAN	
OWNED	0	0	0	0	0	0	0	0	0	0
TERM LS	0	11	0	0	0	0	0	0	0	0
TRIP LS	0	0	0	0	0	0	0	0	0	0
DRIVERS: Inter Intra			TOTAL Drivers: 11			Placards = Yes				
< 100 miles: 0 0			CDL Drivers: 11							
≥ 100 miles: 11 0			Trip Lease/Mo: 0							
THIS REPORT WILL RESULT IN A NEW SAFETY RATING. PLEASE REVIEW IT CAREFULLY.										
QUESTIONS regarding this report or the Federal Motor Carrier Safety or Hazardous Materials rules may be addressed to the Office of Motor Carriers at: 2212 ARLINGTON DOWNS ROAD, SUITE 101 Arlington, TX 76011 (817)633-6375										
NOTICE: Accident analysis and accident countermeasures assistance will be more of an integral part of each motor carrier review than it has been in the past. This will allow the FHWA to further assist each motor carrier in reducing their accident involvement. Accident countermeasures are strategies that may be implemented to improve carrier/driver performance in reducing accidents.										
PERSON(S) INTERVIEWED: WALTER S. BEAZEL AMELIA LANCASTER TITLE: PRESIDENT SAFETY DIRECTOR										
RECEIVED BY: <u>Walter S. Beazel</u>						TITLE: <u>PRESIDENT</u>				
REPORTED BY: <u>Walter S. Beazel</u>						TITLE: <u>SA</u>		CODE: US0490	DATE: 12/18/95	

•

Proco Inc.
700 Proco Trail
Kingsville Texas, 78363
361-516-1112
fax 361-516-1105

United States Department of Transportation

Feb 4, 2002:

Attn: Mr Steve Hurst

I am writing this letter in response to our conversation on Friday, I have enclosed some calculations and pictures as to why we feel that CFR section 178.345-8 on accident damage protection does not govern the cleanout mounted on the front head of our cargo tank.

The CFR actually states in section 178-345-8 (1)

Any dome, sump, or washout cover plate projecting from the cargo tank wall...

It is our very strong belief that this section uses the wording cargo tank wall as opposed to cargo tank, because any nozzle located in the rear head **MUST** be protected by the rear end protection, or shear section, and any nozzle located in the front head is protected by the truck itself, and is shielded from collisions. The cleanout is centered across the vertical centerline of the tank and is therefore protected by the tank itself in a side rollover.

The CFR clearly does not consider the trailer coming loose from the truck a situation which must be guarded against. If they did consider this a scenario to be guarded against all tanks would require accident damage protection on the front, based on the minimum head thickness of the cargo tank, and we have never seen any trailer with accident protection for the front head, or its attachments. The CFR section 178.345-2 states the minimum head thickness of a mild steel tank with a volume of less than 14 gallons per inch to be .100 inches. This design on a standard ASME Flanged and Dished head is good for 5.04 psi pressure on a 60" diameter head. (these are ASME section 8 calculations which have a design factor of safety of 3.5). 5.04 psi pressure times the factor of safety of 3.5 evenly applied over an area of 3,575.53 sq inches is 63,070 pounds of force. This is far less than the 2g force which the CFR requires of the rear end protection.

In the highly unlikely event that one of our tanks did come loose from the truck you can see from the calculations that the 20" cleanout is stronger than the cargo minimum requirements for the cargo tank heads set forth in section 178.345-8. (see page two of attached calculations). This design on a standard ASME Flanged and Dished head is

good for 134.71 psi pressure on a 20" diameter head. (these are ASME section 8 calculations which have a design factor of safety of 3.5). 134.71 psi pressure times the factor of safety of 3.5 evenly applied over an area of 450 sq inches is 212,492 pounds of force. This is far greater than the 2g force which the CFR requires of the rear end protection.

We do appreciate you bringing your concerns forward, and hope you will feel free to contact us with any questions or concerns you might have in the future.

Sincerely,



Noel McKim
Vice President of Engineering

Proco Incorporated
700 Proco Trail Kingsville, TX 78363

Date Printed: 4/3/02

Vessel designed per the ASME Boiler & Pressure Vessel Code,
Section VIII Division 1, 1998 Edition 2000 Addenda
with Advanced Pressure Vessel, Version: 7.2.0
Vessel is ASME Code Stamped

Job No:
head
Vessel Number:
1

NAMEPLATE INFORMATION

MAWP: at 200 °F
MDMT: -20 °F at 0.00 PSI

Purchase Order Number(s): _____

Serial Number(s): _____

National Board Number(s): _____

Year Built: 2002

Radiography: NONE

Postweld Heat Treated: NONE

m maitland
P.O. BOX 728 • 220 S. HARVIN STREET • SUMTER, SC 29151

RETURN RECEIPT
REQUESTED

8321

8321

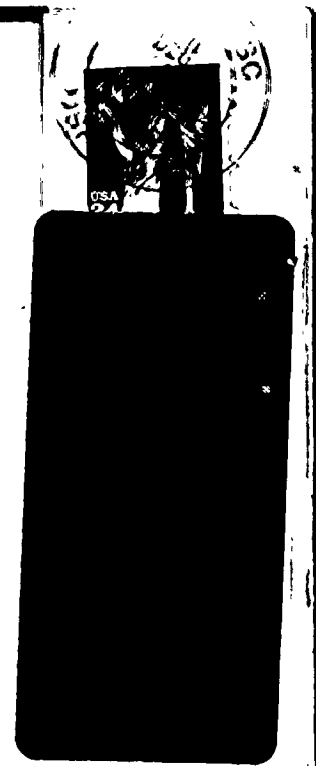
CERTIFIED

Z 409 644 336

MAIL

MR. THOMAS ALLEN
DOT RSPA/OHMS
400 SEVENTH STREET, RM. 8422
WASHINGTON, D.C. 20590-0001

20590+0001



Proco Incorporated
Head 1

Job No: head
Head Number: 1

Vessel Number: 1
Mark Number: H1

Date Printed: 4/3/02

ASME F&D Head Design Information

Design Pressure:	0.00 PSI	Design Temperature:	200 °F
Static Head:	0.00 PSI	Joint Efficiency:	100 %
Head Material:	SA-285 Gr C	Factor B Chart:	CS-2
Corrosion Allowance:	0.0000 in.	Material Stress (hot):	15700 PSI
Head Location:	Right	Material Stress (cold):	15700 PSI
Outside Diameter:	20.0000 in.	Actual Head Stress:	0 PSI
Knuckle (r):	1.2000 in.	Straight Flange:	1.5000 in.
Crown Radius (Lo):	20.0000 in.	Thin Out:	0.0000 in.
M = $\frac{1}{2} [3 + \sqrt{L/r}]$:	1.7642	Extreme Fiber Elongation:	14.20 %
Head Surface Area:	3.13 Sq. Ft.	Specific Gravity:	1.00
Head Estimated Volume:	4.77 Gal.	Weight of Fluid:	39.81 lb.
Head Weight:	31.92 lb.	Total Flooded Head Weight:	71.73 lb.

Minimum Design Metal Temperature Data

Min. Temperature Curve:	A	Pressure at MDMT:	0.00 PSI
UCS-68(b) reduction:	Yes	Minimum Design Metal Temperature:	-20 °F
UCS-68(c) reduction:	No	Computed Minimum Temperature:	-122 °F

External Pressure Data

Design Pressure (Pa):	15.00 PSI	Design Temperature:	200 °F
Ext. Minimum t:	0.0625 in.	Ext. Nominal t:	0.2500 in.
Minimum t - Ca - Thin Out:	0.0625 in.	Nominal t - Ca - Thin Out:	0.2500 in.
Minimum Factor A:	0.0003906	Nominal Factor A:	0.0015625
Minimum Factor B:	5664 PSI	Nominal Factor B:	14118 PSI

Design Thickness Calculations

Design Thickness Calculations per Appendix 1-4(d)

$$t = \frac{P L_o M}{2 S E + P(M - 0.2)} = \frac{0.00 \times 20.0000 \times 1.7642}{2 \times 15700 \times 1.00 + 0.00 (1.7642 - 0.2)} = \text{Greater of } (0.0000(\text{Calc.}), 0.0625(\text{Min. t})) + 0.0000 (\text{corrosion}) + 0.1$$

Maximum External Pressure Calculation per Paragraph UG-33

$$P_a (\text{using nominal t}) = \frac{2 S E t}{M L_o - t(M - 0.2)} / 1.67 = \frac{2 \times 15700 \times 1.00 \times 0.2500}{1.7642 \times 20.0000 - 0.2500(1.7642 - 0.2)} / 1.67$$

= maximum external pressure of 134.71 PSI

External loads do not control design.

Minimum Head Thickness Selected = 0.2500 in.

Proco Incorporated
Head 2

Job No: head
Head Number: 2

Vessel Number: 1
Mark Number: H2

Date Printed: 4/3/02

ASME F&D Head Design Information

Design Pressure:	0.00 PSI	Design Temperature:	200 °F
Static Head:	0.00 PSI	Joint Efficiency:	100 %
Head Material:	SA-36 Plate	Factor B Chart:	CS-2
Corrosion Allowance:	0.0000 in.	Material Stress (hot):	16600 PSI
Head Location:	Left	Material Stress (cold):	16600 PSI
Outside Diameter:	60.0000 in.	Actual Head Stress:	0 PSI
Knuckle (r):	3.6000 in.	Straight Flange:	1.5000 in.
Crown Radius (Lo):	60.0000 in.	Thin Out:	0.0000 in.
M = $\frac{X}{3 + \sqrt{L/r}}$:	1.7685	Extreme Fiber Elongation:	5.03 %
Head Surface Area:	24.71 Sq. Ft.	Specific Gravity:	1.00
Head Estimated Volume:	98.80 Gal.	Weight of Fluid:	824.00 lb.
Head Weight:	251.79 lb.	Total Flooded Head Weight:	1075.79 lb.

Minimum Design Metal Temperature Data

Min. Temperature Curve:	A	Pressure at MDMT:	0.00 PSI
UCS-66(b) reduction:	Yes	Minimum Design Metal Temperature:	-20 °F
UCS-68(c) reduction:	No	Computed Minimum Temperature:	-122 °F

Design Thickness Calculations

Design Thickness Calculations per Appendix 1-4(d)

$$t = \frac{P L_o M}{2 S E + P(M - 0.2)} = \frac{0.00 \times 60.0000 \times 1.7685}{2 \times 16600 \times 1.00 + 0.00 (1.7685 - 0.2)} = \text{Greater of } (0.0000(\text{Calc.}), 0.0625(\text{Min. } t)) + 0.0000 (\text{corrosion}) + 0.1$$

External loads do not control design.

Minimum Head Thickness Selected = 0.2500 in.

Proco Incorporated
Head 3

Job No: head
Head Number: 3

Vessel Number: 1
Mark Number: H3

Date Printed: 4/3/02

ASME F&D Head Design Information

Design Thickness:	0.1000 in.	Design Temperature:	200 °F
Head Material:	SA-36 Plate	Joint Efficiency:	100 %
Corrosion Allowance:	0.0000 in.	Factor B Chart:	CS-2
Head Location:	Other	Material Stress (hot):	16600 PSI
Outside Diameter:	60.0000 in.	Material Stress (cold):	16600 PSI
Knuckle (r):	3.6000 in.	Actual Head Stress:	16599 PSI
Crown Radius (Lo):	60.0000 in.	Straight Flange:	1.5000 in.
M = $\frac{1}{2} [3 + \sqrt{L/r}]$:	1.7698	Thin Out:	0.0000 in.
Head Surface Area:	24.83 Sq. Ft.	Extreme Fiber Elongation:	2.05 %
Head Estimated Volume:	100.28 Gal.	Specific Gravity:	1.00
Head Weight:	101.20 lb.	Weight of Fluid:	838.36 lb.
		Total Flooded Head Weight:	937.56 lb.

Minimum Design Metal Temperature Data

Min. Temperature Curve:	A	Pressure at MDMT:	0.00 PSI
UCS-66(b) reduction:	Yes	Minimum Design Metal Temperature:	-20 °F
UCS-68(c) reduction:	No	Computed Minimum Temperature:	-122 °F

External Pressure Data

Design Pressure (Pa):	5.00 PSI	Design Temperature:	0 °F
Ext. Minimum t:	0.0997 in.	Ext. Nominal t:	0.1000 in.
Minimum t - Ca - Thin Out:	0.0997 in.	Nominal t - Ca - Thin Out:	0.1000 in.
Minimum Factor A:	0.0002077	Nominal Factor A:	0.0002083
Minimum Factor B:	3012 PSI	Nominal Factor B:	3021 PSI

Design Pressure Calculations

Design Pressure Calculations per Appendix 1-4(d)

$$P = \frac{2SEt}{ML_0 - t(M - 0.2)} = \frac{2 * 16600 * 1.00 * 0.1000}{1.7698 * 60.0000 - 0.1000(1.7698 - 0.2)} = \text{maximum design pressure of 31.31 PSI}$$

Maximum External Pressure Calculation per Paragraph UG-33

$$P_a (\text{using nominal } t) = \frac{B}{\frac{R_o}{t}} = \frac{3021}{\frac{60.0000}{0.1000}} = \text{maximum external pressure of 5.04 PSI}$$

External loads do not control design.

Maximum Design Pressure, P = 31.31 PSI

Proco Incorporated

Job No: head

Vessel Number: 1

Date Printed: 4/3/02

MDMT Report by Components
Design MDMT is -20 °F

<u>Component</u>	<u>Material</u>	<u>Curve</u>	<u>Pressure</u>	<u>MDMT</u>
Head 1	SA-285 Gr C	A	0.00 PSI	-122 °F
Head 2	SA-36 Plate	A	0.00 PSI	-122 °F
Head 3	SA-36 Plate	A	0.00 PSI	-122 °F

Component with highest MDMT: Head 1.

Computed MDMT = -122 °F

The required design MDMT of -20 °F has been met or exceeded.

ANSI Flanges Are Not Included in MDMT Calculations.

Proco Incorporated

Job No: head

Vessel Number: 1

Date Printed: 4/3/02

MAWP Report by Components

Component	Vessel MAWP		Component MAWP		Vessel MAWP	
	Design Pressure	Static Head	New & Cold UG-98(a)	Hot & Corroded UG-98(b)	Hot & Corroded UG-98(a)	Hot & Corroded UG-98(b)
Head 1	0.00 PSI	0.00 PSI	224.97 PSI	224.97 PSI	224.97 PSI	224.97 PSI
Head 2	0.00 PSI	0.00 PSI	78.51 PSI	78.51 PSI	78.51 PSI	78.51 PSI
Head 3	31.31 PSI	0.00 PSI	31.31 PSI	31.31 PSI	31.31 PSI	31.31 PSI

NC = Not Calculated Inc = Incomplete

Summary

Component with the lowest vessel MAWP(New & Cold) : Head 3

The lowest vessel MAWP(New & Cold) :

31.31 PSI

Component with the lowest vessel MAWP(Hot & Corroded) : Head 3

The lowest vessel MAWP(Hot & Corroded) :

31.31 PSI

Pressures are exclusive of any external loads.



TELEFAX TRANSMISSION COVER SHEET

U.S. Department
of Transportation
Federal Motor Carrier
Safety Administration

TEXAS DIVISION OFFICE

Federal Building, Room 8A00
819 Taylor Street
Fort Worth, Texas 76102

DATE: May 30, 2002

SUBJECT: Proco, Inc.

To : Mr. Thomas Allen

RSPA

TELEFAX # : 202-366-3012

PHONE # : 202-366-8983

11 PAGES FAXED INCLUDING THE COVER.

From: STEVE HURST

PHONE # : 817-978-3225

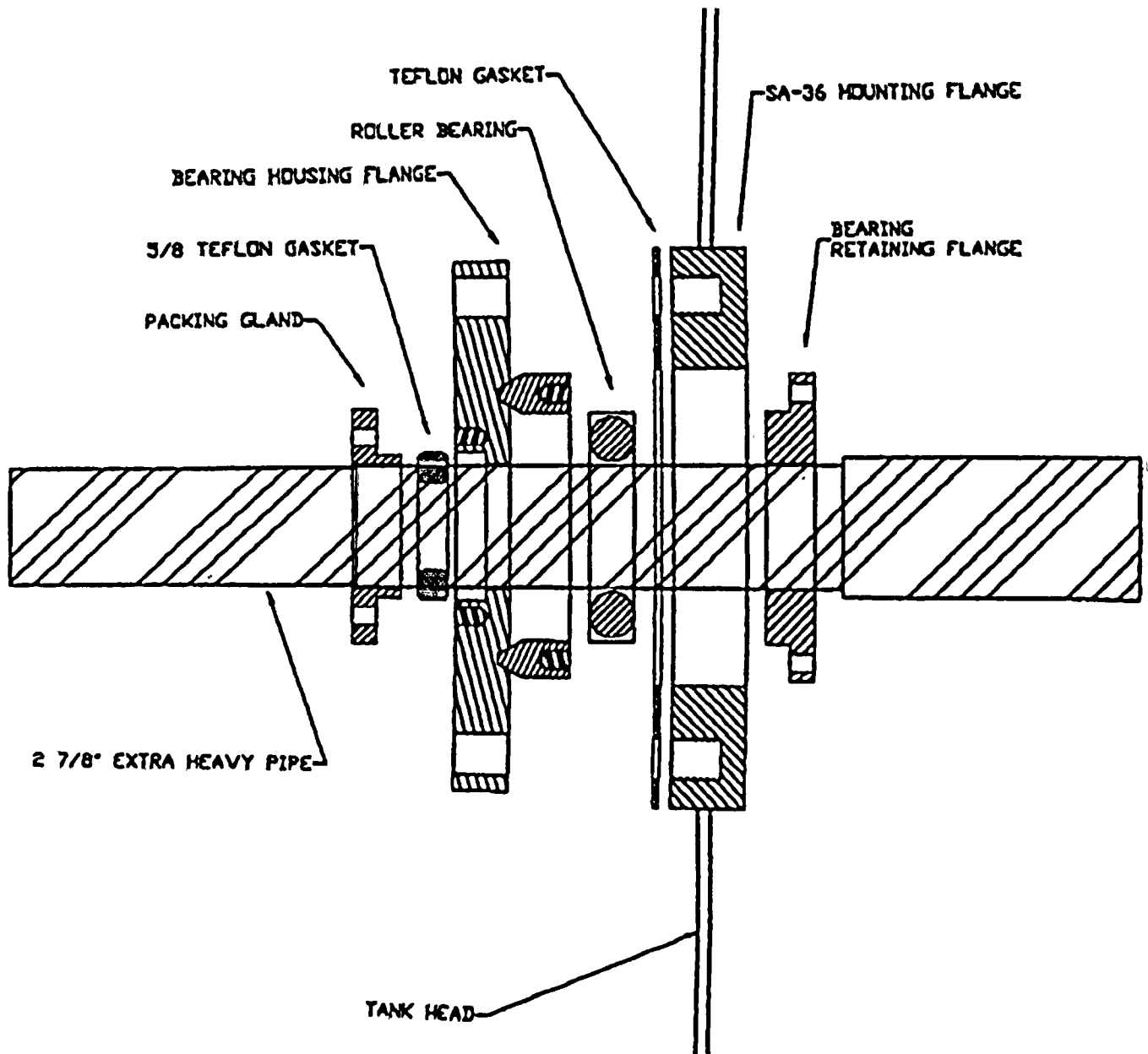
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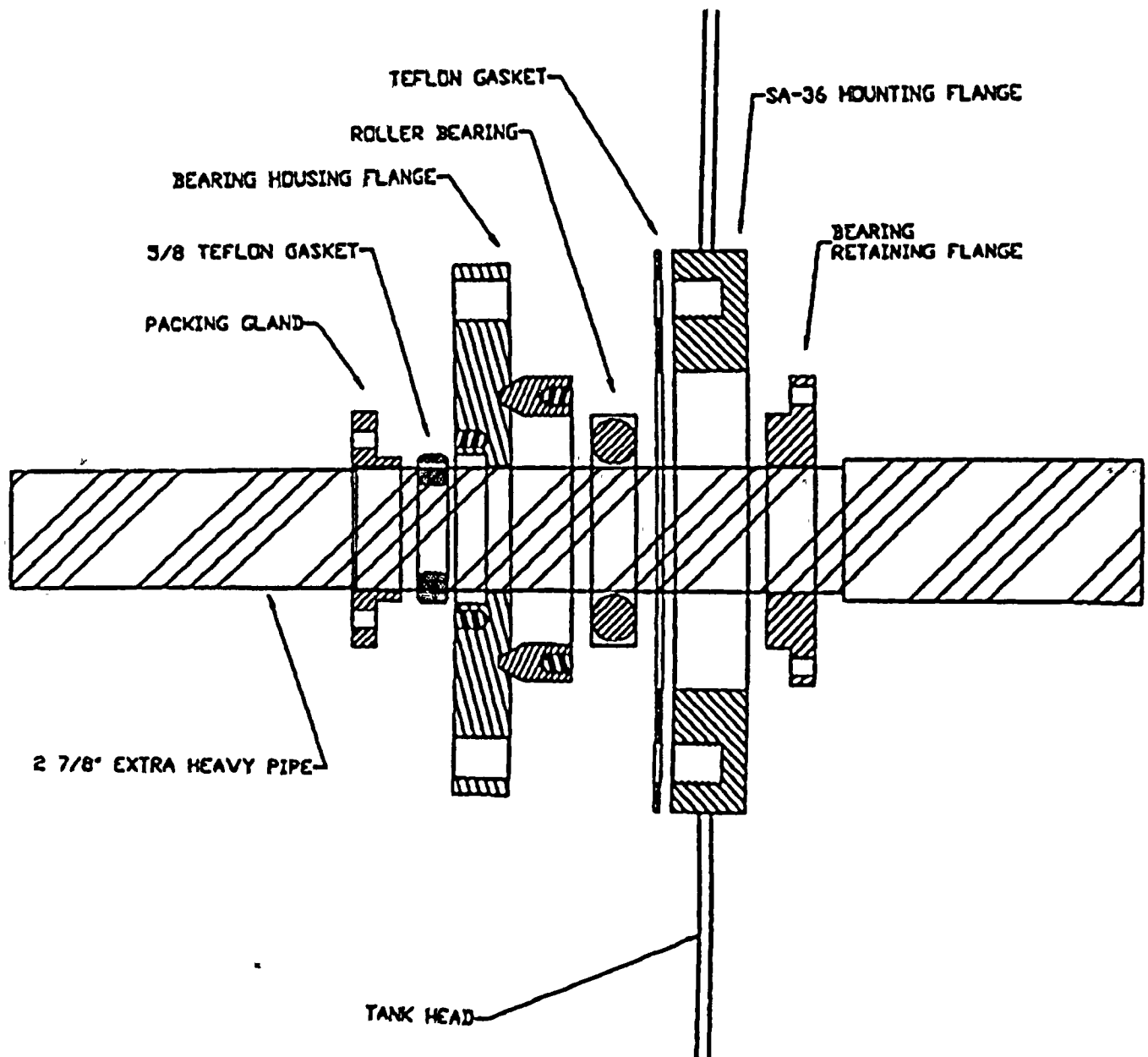
PROCO, INC.

TITLE	NUMBER	APP. BY	DATE	SCALE
AUGER SHAFT RETAINING SYSTEM	6001		12/01/99	N.T.S.



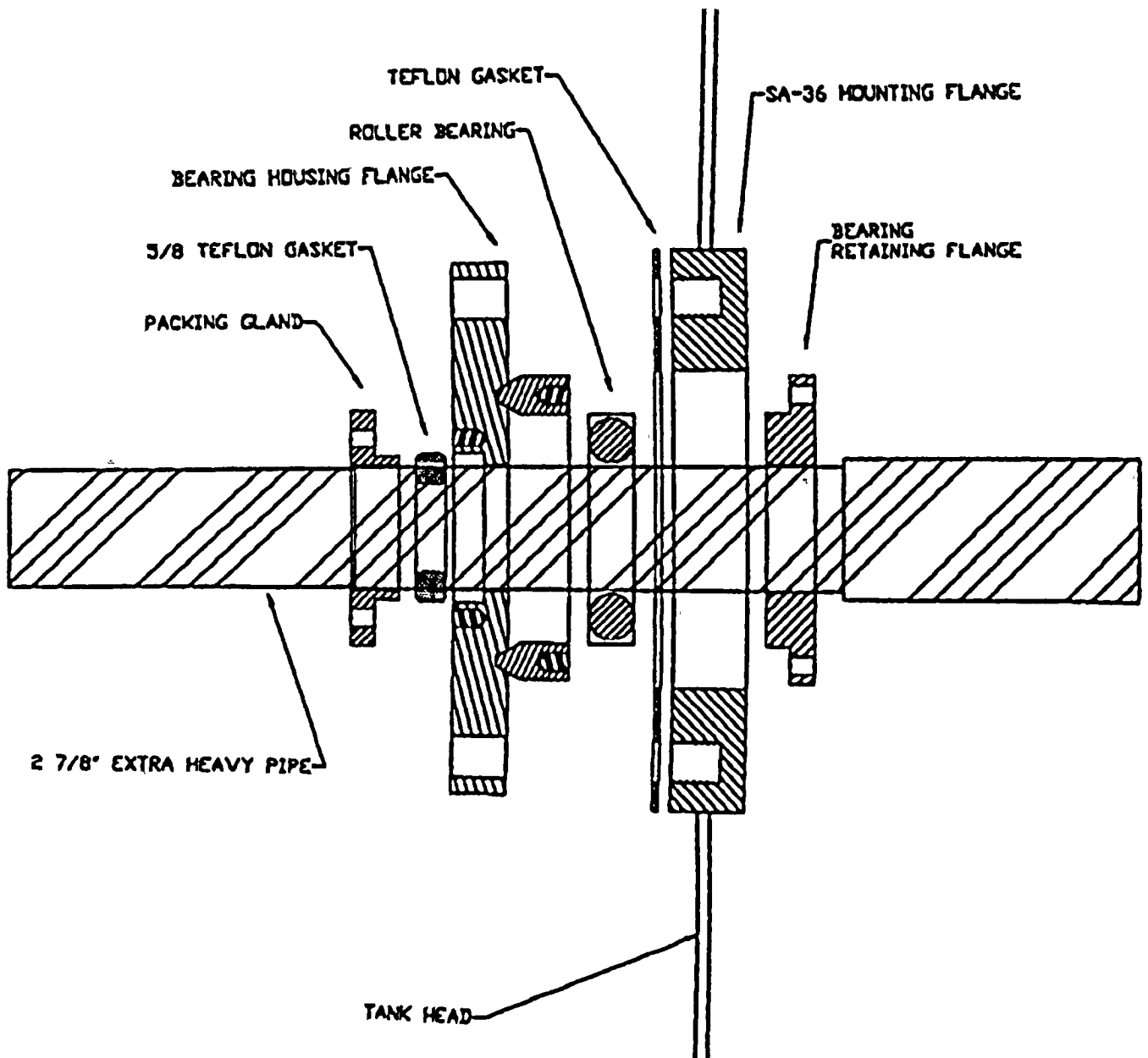
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U.S. Department
of Transportation
**Federal Highway
Administration**

Texas Division Office
300 E. 8th Street, Rm. 826
Austin, Texas 78701

October 24, 2001

In Reply Refer To:

HPC-TX

Structural Evaluation of Cargo Tanks

Proco Incorporated
700 Proco Trail
Kingsville, Texas 78363
361-516-1112

Mr. Stephen M Hurst
Hazardous Materials Program Specialist
FMCSA
819 Taylor St., Room 8A06
Fort Worth, Texas 76102

Dear Mr. Hurst:

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Sincerely,

Peter Chang, P.E.
Structural Engineer

Enclosures

Cargo Tank Manufacturer Review

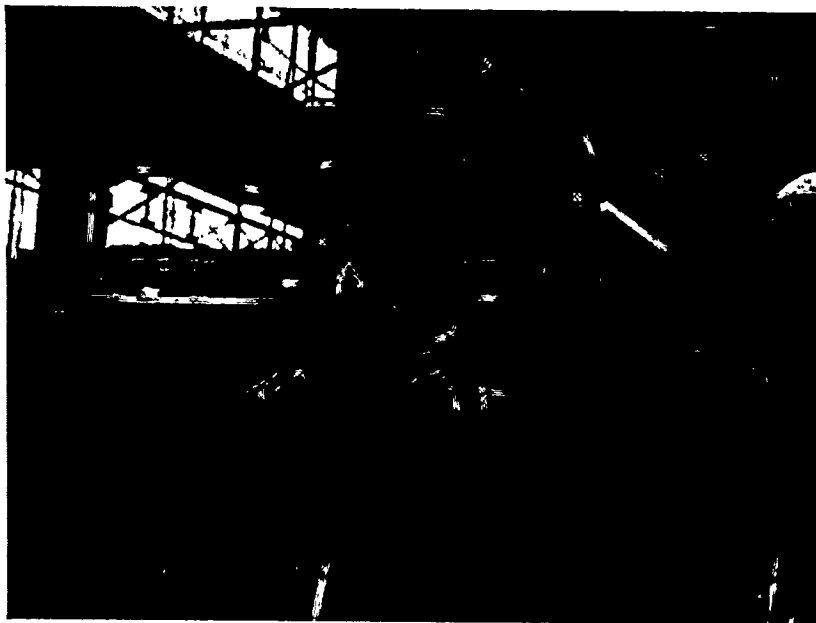
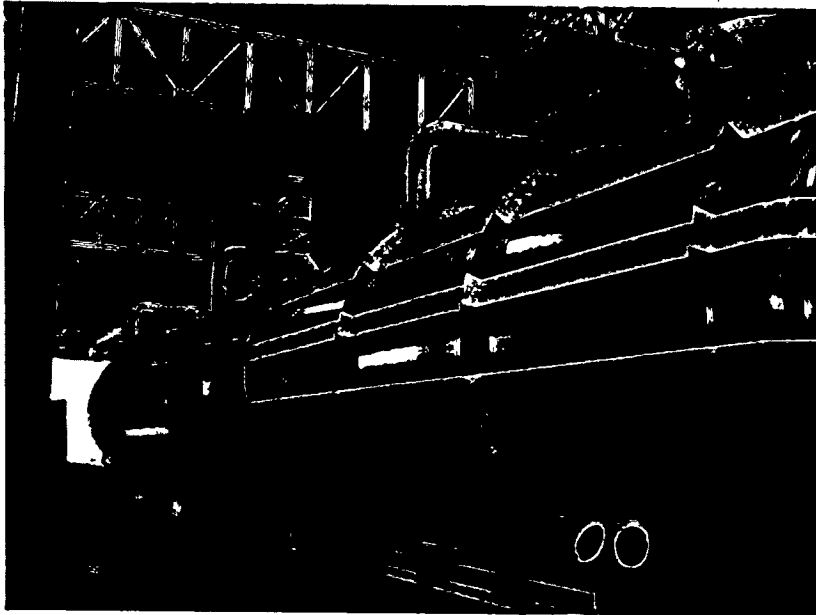
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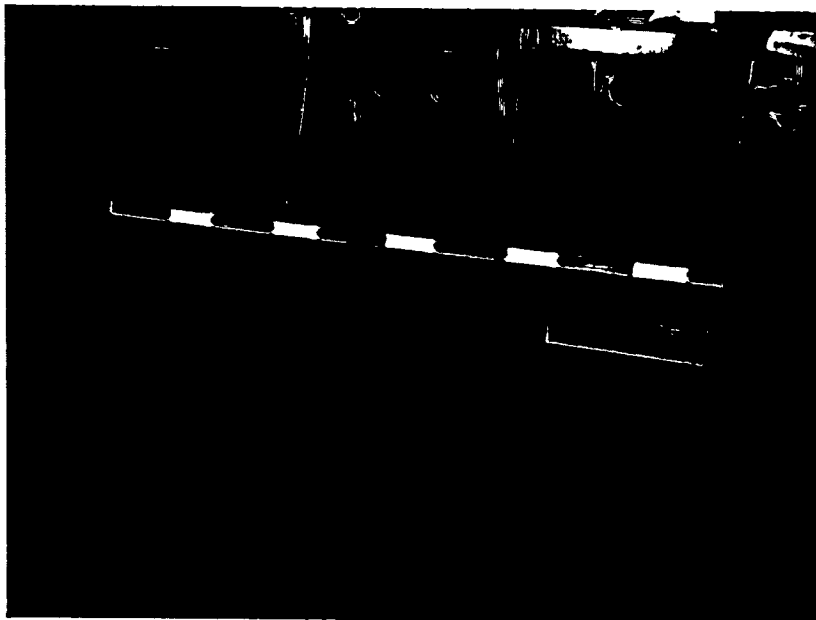
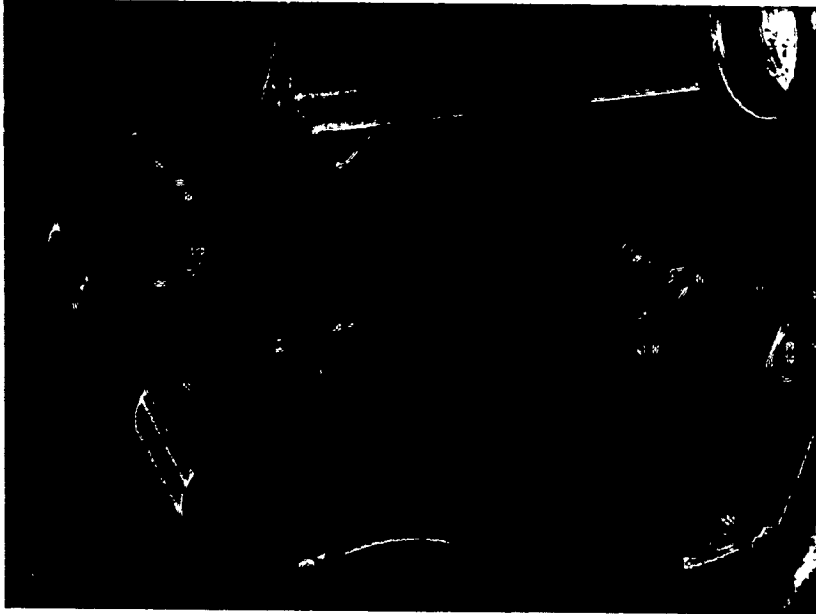
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$M_{\text{max}} = WL^2/2 = 1,417 \times 29^2 / 2 = 595,849 \text{ in-lb}$

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ASTM A36 Steel Tensile Strength Ultimate = 68,893 psi, Yield = 36,260 psi

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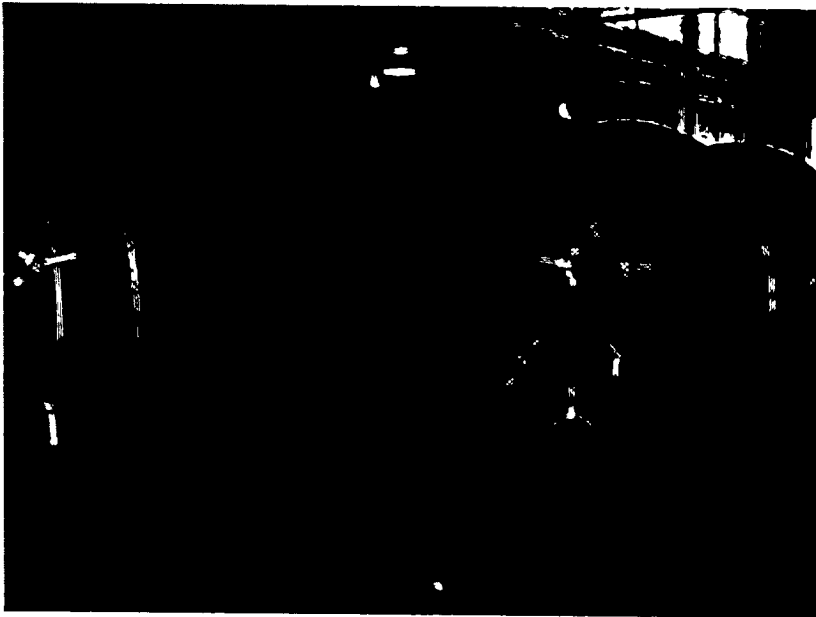
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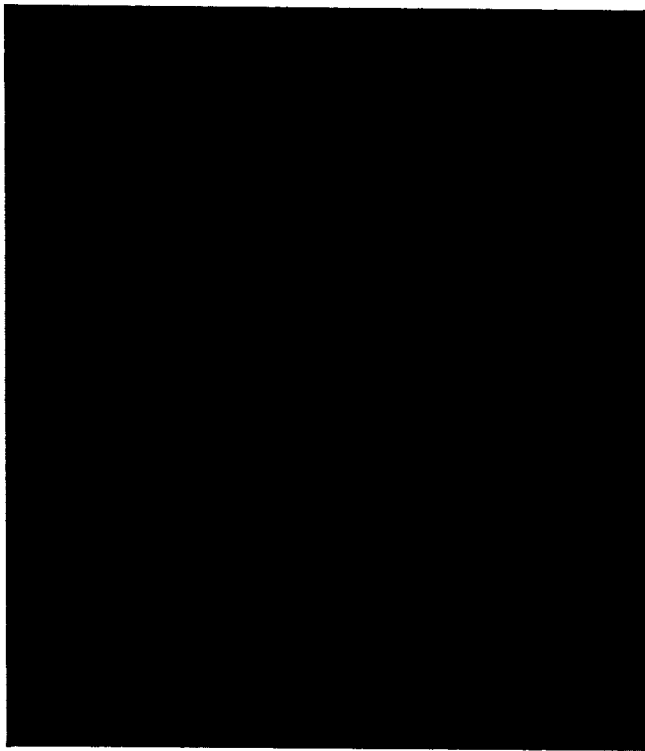
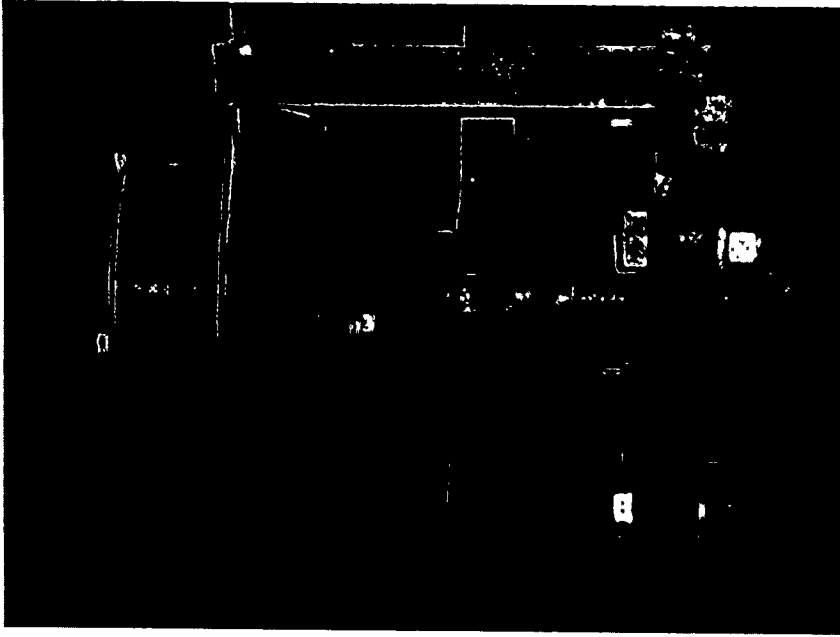
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Proco Inc.
700 Proco Trail
Kingsville Texas, 78363
361-516-1112
fax 361-516-1105

United States Department of Transportation

Feb 4, 2002:

Attn: Mr Steve Hurst

I am writing this letter in response to our conversation on Friday, I have enclosed some calculations and pictures as to why we feel that CFR section 178.345-8 on accident damage protection does not govern the cleanout mounted on the front head of our cargo tank.

The CFR actually states in section 178-345-8 (1)

Any dome, sump, or washout cover plate projecting from the cargo tank wall...

It is our very strong belief that this section uses the wording cargo tank wall as opposed to cargo tank, because any nozzle located in the rear head MUST be protected by the rear end protection, or shear section, and any nozzle located in the front head is protected by the truck itself, and is shielded from collisions. The cleanout is centered across the vertical centerline of the tank and is therefore protected by the tank itself in a side rollover.

The CFR clearly does not consider the trailer coming loose from the truck a situation which must be guarded against. If they did consider this a scenario to be guarded against all tanks would require accident damage protection on the front, based on the minimum head thickness of the cargo tank, and we have never seen any trailer with accident protection for the front head, or its attachments. The CFR section 178.345-2 states the minimum head thickness of a mild steel tank with a volume of less than 14 gallons per inch to be .100 inches. This design on a standard ASME Flanged and Dished head is good for 5.04 psi pressure on a 60" diameter head. (these are ASME section 8 calculations which have a design factor of safety of 3.5). 5.04 psi pressure times the factor of safety of 3.5 evenly applied over an area of 3,575.53 sq inches is 63,070 pounds of force. This is far less than the 2g force which the CFR requires of the rear end protection.

In the highly unlikely event that one of our tanks did come loose from the truck you can see from the calculations that the 20" cleanout is stronger than the cargo minimum

requirements for the cargo tank heads set forth in section 178.345-8. (see page two of attached calculations). This design on a standard ASME Flanged and Dished head is good for 134.71 psi pressure on a 20" diameter head. (these are ASME section 8 calculations which have a design factor of safety of 3.5). 134.71 psi pressure times the factor of safety of 3.5 evenly applied over an area of 450 sq inches is 212,492 pounds of force. This is far greater than the 2g force which the CFR requires of the rear end protection.

We do appreciate you bringing your concerns forward, and hope you will feel free to contact us with any questions or concerns you might have in the future.

Sincerely;

Noel McKim
Vice President of Engineering



TELEFAX TRANSMISSION COVER SHEET

U.S. Department
of Transportation
Federal Motor Carrier
Safety Administration

TEXAS DIVISION OFFICE

Federal Building, Room 8A00
819 Taylor Street
Fort Worth, Texas 76102

DATE: May 30, 2002

SUBJECT: Proco, Inc.

To : Mr. Thomas Allen

RSPA

TELEFAX # : 202-366-3012

PHONE # : 202-366-8983

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" Wrangler" Auger Trailer "

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Shell	62" I.D. x 38' x 3/16" straight cylinder, SA-36 mild steel 6100 gallons Capacity
Heads	62" O.D. x 3/8" A.S.M.E. flanged and dished, SA-36 mild steel
Rings	(10) 2" 1/2" x 3/8" flat bar
Manways	20" hinged pressure type using six wing-nut latches for tie-downs
Clean-Out	20 manways mounted low in the front and rear heads
Auger	Auger running full length of tank on a 150 degree hydraulic arc swing. Auger swing is automatically timed for continuous swing. Auger is powered by external hydraulic motor with an internal chain drive, no hydraulics located inside tank compartment
Valving	4" load/unload, air/spring close ball valve with 4" manual secondary valve c/w stainless camlock fitting and dust cap located inside tank compartment
Relief Devices	4" Girard pressure relief valve
Level Indicator	Internal float type using 5" cylindrical stainless steel ball w/6" flange/blind for outside servicing
Nitrogen	3/4" crows foot c/w check valve and block valve.
King Pin	Bolt on adjustable 3/8" king pin plate
Frame	1/4" formed plate front and rear with 3/16" center frame. Full length
Lights	12 volt to conform to federal safety standard # 108. One Halogen high intensity area work light mounted at rear. Tail lights to be boxed and sealed. Lights to be boxed and sealed. Lights are GROTE Ultra-Blue-Seal modular wiring system or equal
Suspension	Waston-Chalin heavy duty air ride c/w manual dump valve
Axles	5" round 25,000 capacity with stemco (TM) oil sealed and hubs

Wheels & Tires	Eight 24.5" x 8.25" ten hole steel disc. 11R24.5 steel belted radials
Brakes	16 1/2" x 7" air with automatic slack adjusters
Mud Flaps	Premium Proco (Anti Sail) mud flaps
Landing Gear	Two speed telescoping with sand shoes
Gauge	4" liquid filled vac/pres gauge mounted at rear of tank
Walkway	12" mounted on side of tank, non-slip c/w handrails
Placards	Flip type placards
Static Reel	50' static reel
Spill Box	spill box around center top manway c/w drain lines
Fire Extinguisher	10# fire extinguisher c/w bracket
Engine	2 cylinder, air cooled, diesel power unit totally enclosed c/w electric start and control panel
Fuel Tank	30 gallon with vibration proof supply lines
Hydraulic Drive	Vickers pressure-compensated pump and Char-Lynn motor c/w (2) hydraulic system pressure gauges
Hydraulic Cooler	Hydraulic cooler c/w 2.5 gallon reservoir, return filter and valves
Paint	Sand blasted to gray. Heavy duty prime coat. Standard one color top coat. Side and rear reflective tape will be installed per DOT specifications
Standard equipment subject to change without notice.	
Optional Equipment	
Hose Tubes	(2) 8" x 21' Aluminum hose tubes c/w ends
Wet Kit Drive	Delete self contained power source, hydraulic to run from tracker's wet kit
Vacuum Pump	Self loading hydraulic driven RCF-250 <u>Fruitland</u> vacuum pumps

Application:

K-Waste * Sewage Handling * Paint Waste * Agriculture * Mixing Capabilities *

Chemical Waste



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Wrangle Auger Trailer

6,100 u.s. Gal.

Proco Features

**DOT 407/412 * A.S.M.E. Coded * User Friendly Controls *
High Solid Compabilities * Mixing Capabilities**

Trailer Boss 130 BBL ASME Coded Vacuum Trailer

Back to products



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The 12" diameter auger swings through a 150° arc across the bottom of the vessel to keep the entire load agitated.



The primary discharge valve is a 4" Flow-Tek ball valve selected for its abrasion resistance. The secondary is a Betts 4" gate valve.

Hub City Environmental. . .

cfm vacuum pumps. Both the others are stainless steel; one is a Proco and one is a Brenner.

The shells and heads of all the vacuum trailers are rolled from 3/16-inch mild steel. The eight external rings are made from 3/8-inch flat bar stock. The vessel is 40 feet long overall with an inside diameter of 58 inches, providing a capacity of 5,460 gallons. The trailers without an auger system have two surge-type baffles.

Three 20-inch manways are made by National Vacuum Equipment with six wing nut latches. One is surrounded by a spill containment box.

The secondary discharge is a stainless steel Betts four-inch sliding gate valve. A four-inch Girard stainless steel pressure/vacuum vent is mounted on

top of the tank near the center manhole.

The vacuum kit is made up of an outside scrubber, two-inch blow-down line with a ball valve, a six-inch inside float shutoff, and a pressure gauge.

The 19 nonvacuum trailers in the Hub City fleet are all 6,500-gallon, stainless steel, MC307 trailers built by The Heil Company.

Knowing the Company Helps

Given CFO Quitman Lindley's experience as a Navistar International dealer, it was natural for him to turn to that manufacturer when he began selecting tractors for Hub City's fleet. "I think International provides the most truck for the money," Lindley says. "I've always had good experiences with the company and their products."

The new tractors the company has

ordered are conventional model 9400 Pro-Sleepers with Cummins N14-400 ESP III electronic engines capable of 400 to 460 horsepower. The transmissions are Spicer 10-speed manuals with overdrive.

The suspension systems are 12,000-lb parabolic taper springs on the front and International Air-Ride on the rear. The air bag-type rear suspensions have a leveling valve with the pressure controls inside the cab.

The cabs and sleepers are aluminum and are mounted on air springs. The sleeper is 72 inches. The driver seats specified are high-back Bostrom Talladegas with air ride.

The wheels are all 10-stud steel discs painted white. Tires are 11R24.5 14-ply Goodyear radials.

Hub City has 42 drivers stationed



The chain drive for the auger is sealed in a steel housing and is mounted inside the vessel. The entire unit is immersed in the load when the tank is full. Special seals protect the chain drive.

Pairs of hydraulic cylinders mounted on the outside of the tank heads control the oscillation of the auger. The speed of the swing can be varied to accommodate loads of different densities.



Ewer went back to the Proco plant in Corpus Christi, Texas (the plant is now in Beeville, Texas) and started on improvements immediately. Working out one bug at a time, ten years later he produced an auger trailer that works very well, and on which he now holds a patent.

"We did so many modifications on our original design, I didn't apply for a patent until I knew most of our ideas would be covered," Ewer says. "The auger trailer we're selling now has been available for about three years with all the fixtures and features we felt it should have."

The Proco augers are in MC307/MC312 vessels mounted on sturdy trailer frames. The latest version has a 12-inch-diameter, 30-foot auger cast by Thomas Conveyor running the length of the tank. Rotation is provided by a chain drive sealed in a steel box mounted inside the vessels.

Circular Flow

During operation, the auger pushes the solids forward to the front head. Continuing pressure from the auger forces the waste up and back to the rear of the tank along the top surface of the load. When it reaches the curved rear head, the waste is pushed down and is picked up by the auger for another cycle. For unloading, the auger is reversed and the waste is pushed to the rear of the tank and the outlet valve.

As the auger rotates, pairs of hydraulic cylinders mounted on the outside of each tank head swing the auger through 150 degrees of arc from side-to-side across the bottom of the tank. This sweeping action helps to keep the entire load in motion and solids entrained in the liquid. The speed of os-



In addition to its vacuum trailers, Hub City has 19 Heil MC307 insulated stainless steel transporters. Two of the trailers are equipped with auger systems.

cillation can be varied, although the most efficient speed is about two minutes per full cycle.

"The only place we get settling is at the rear of the tank," Johnson says. "As the waste comes over the top and flows down, the solids tend to drop out. There's so little material involved, it isn't a problem. Even if a loaded trailer has been sitting for a while without agitation, we can get a homogeneous load with the auger after only about an hour of mixing."

The auger trailer can handle undissolved particulates up to a half inch in diameter and could manage even larger pieces if the need arose. "The limiting factor is the screens our customers use at the kilns," Johnson explains. "They won't pass anything larger than a half inch."

Each of the vacuum auger trailers has its own power source. A 35-horsepower Hatz diesel engine is mounted in a frame under the belly of the tank with its own 30-hour fuel supply and a Blackmer hydraulic oil cooler. All controls and gauges are mounted in the belly frame for convenient operation.

The hydraulic drive system includes a Vickers pressure-compensated pump and a Char-Lynn motor made by the hydraulics division of Eaton.

In addition to the auger trailers' ability to haul high-solids waste, some have been used by Hub City to blend chemicals for customers to achieve acceptable concentrations of heavy metals and proper levels of combustibles in a load. They have also been used on-site to neutralize acids.

No Corrosion or Abrasion

"We were worried about corrosion and abrasion when we first started working on the auger trailer," Johnson says, "but neither is a problem now. The auger and the tank are made of carbon steel and have shown very little tendency to wear.

"We had trouble with the discharge

valve in the beginning," Johnson recalls. "Abrasion from the high solids material caused wear on the ball and the valve would fail prematurely. Switching to a different valve has cured that problem."

The primary discharge valve in use now is a four-inch ball valve made by Flow-Tek.

"We've had no maintenance or repair problems with our augers," Johnson says. "I've heard of one that has been in service for three years and has not required parts or repairs on the auger system in that time."

Proco builds a full frame for its auger trailers. The rails are made in three sections and run the full length of the vessel. The front and rear sections are 1/4-inch steel and the center section is 3/16-inch. The belly frame for mounting the auger engine and controls is fabricated from 1/4-inch-thick steel angles.

Watson-Chalin supplies the air-ride suspensions. "We originally used regular leaf spring suspensions on the auger trailers," Johnson says. "But we had a lot of wear on the auger bearings. Switching to the air-ride suspension has almost eliminated that."

As an added benefit, the air ride allows drivers to lower the rear of the trailer as much as six inches to help increase the flow of material during unloading.

The auger system adds \$30,000 to \$35,000 to the cost of a vacuum trailer and \$25,000 to \$30,000 to the cost of an MC307 tanker, but Johnson thinks it is well worth the extra cost. "We keep all our auger trailers busy all the time. That's why we have six more on order and we're pressuring Proco to get them built."

Regular Vacuum Trailers

In addition to its nine auger trailers, Hub City has four traditional vacuum trailers. Two were made by Proco of carbon steel and have Fruitland 300-



Rudy Johnson, president of Hub City.



**U.S. Department
of Transportation
Federal Highway
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**Texas Division Office
300 E. 8th Street, Rm. 826
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October 24, 2001

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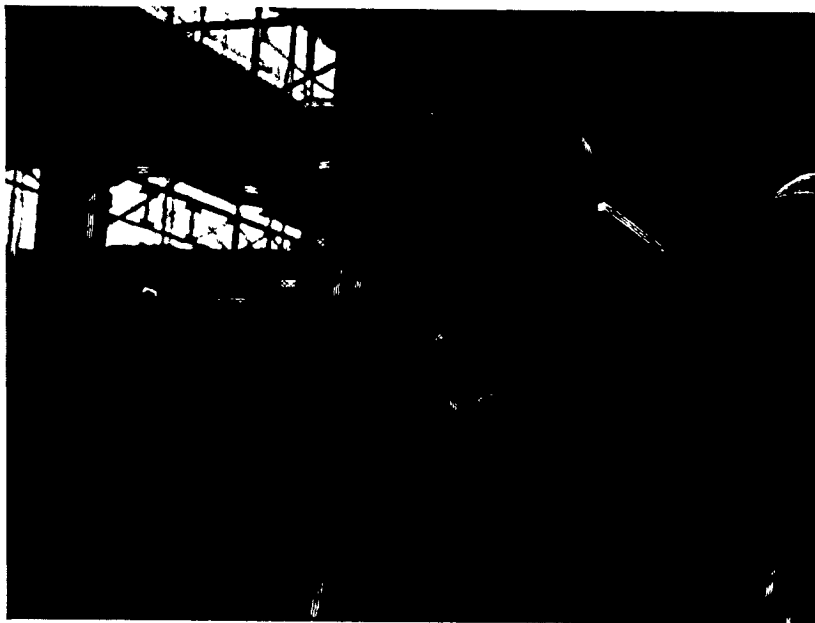
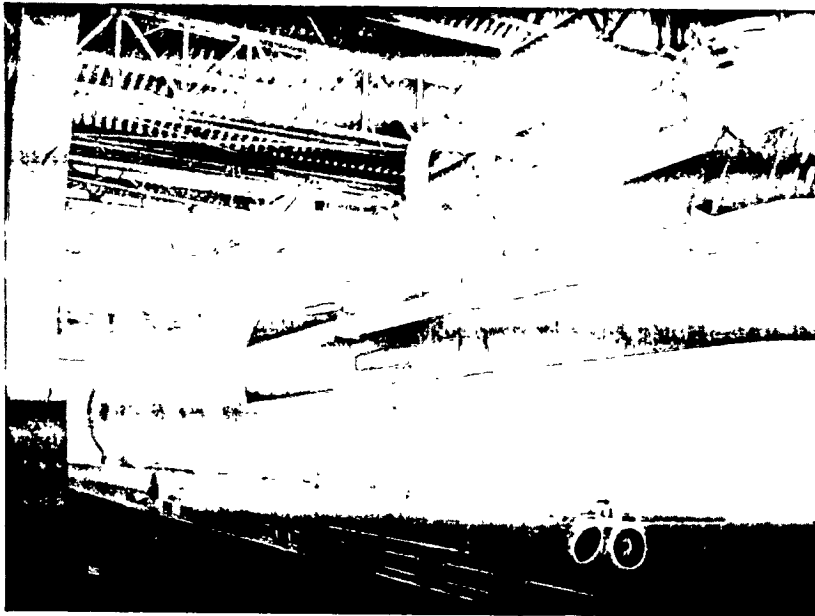
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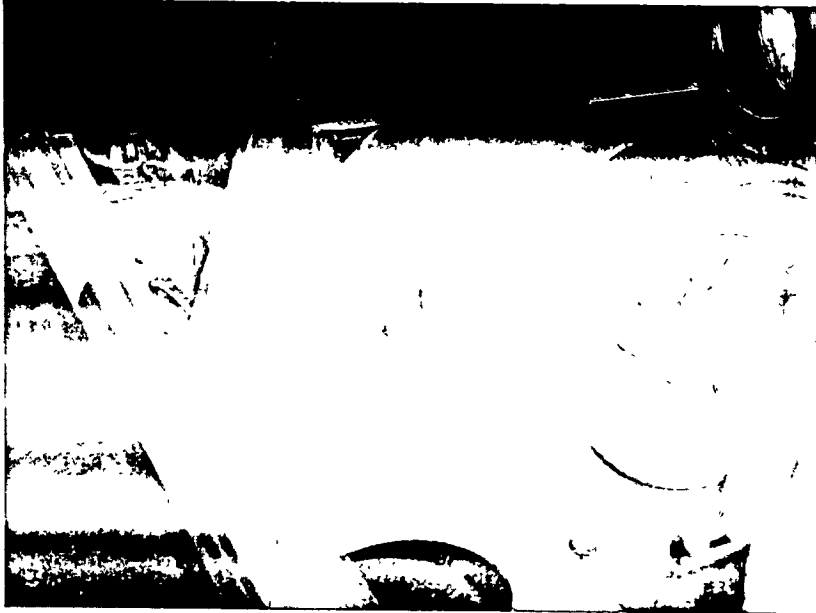
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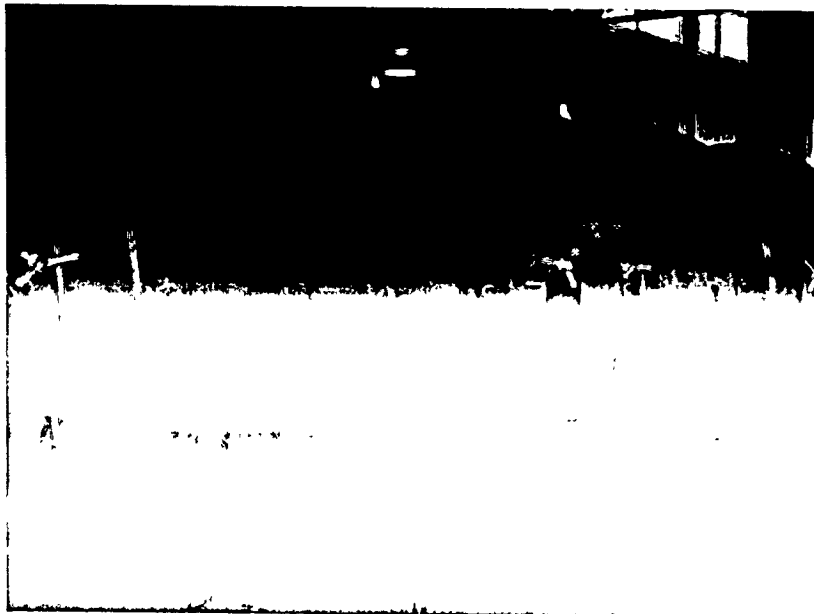
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