ORGANIC CHEMICALS DIVISION RESEARCH Report

REPORT NO. P-1588 JOB NO. 2-21-760.01-1113115

TENTATIVE PROCESS

FOR

PYDRAUL A-200B (MCS 1067)

DATE - November 11, 1970 WRITTEN BY P. D. Fowlkes

Monsanto

ST. LOUIS, MISSOURI

DSW 620268

STLCOPCB4094295

1) Pydraul A-200B (MCS 1067) - fire resistant hydraulic fluid tent process

REFERENCE BOOK

Not To Be Taken From Library

MONSANTO COMPANY
Organic Chemicals Division
St. Louis Research Department

SAFETY REVIEW COMMITTEE
APPROVED BY [signature] 11/16/70
[signature] 11/16/70
[signature] 11/18/70

2) Chlorinated biphenyl removed from Pydraul A-200

St. Louis Research Report No. P-1588

TENTATIVE PROCESS

FOR

PYDRAUL A-200B (MCS 1067)

Job No. 2-21-760.01-1113115

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1700 SOUTH SECOND STREET

Written by: P. D. Fowlkes

Work done by: P. D. Fowlkes
L. F. Smith
L. R. Stark

Date: November 11, 1970

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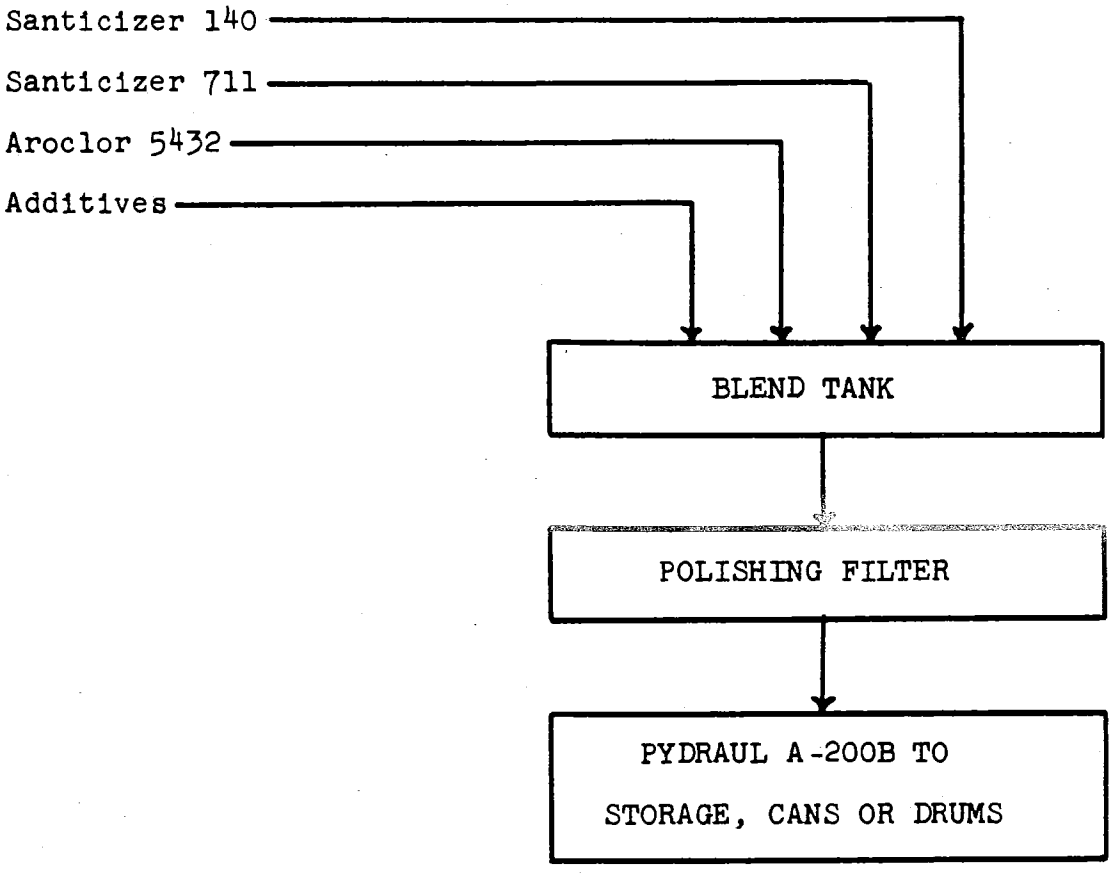
INTRODUCTION

Pydraul A-200B (MCS 1067) is a fire resistant hydraulic fluid which was developed to remove chlorinated biphenyl from Pydraul A-200.

SYNOPSIS OF PROCESS

Pydraul A-200B is prepared by blending Santicizer 140, Santicizer 711, Aroclor 5432, and additives. The finished product is then filtered to remove any stray debris from raw materials or blending and transferred to containers or storage.

FLOW SHEET



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BILL OF MATERIALS

Basis, 100 lbs. of product

	Raw Material	Wt., lbs.
80151	Santicizer 140	59.3
86840	Santicizer 711	10.0
82621	Aroclor 5432	30.0
51351	Santolube 70-A	0.3
46310	Paraplex G-62	0.3
60015	Tolyltriazole	0.1
31100	DC-200, 350 cs. fluid	0.002
20640	DuPont 0.1 Blue A Dye	0.0007

PROCESS IN DETAIL

The blending operation may be carried out in any suitable metal or glass lined vessel. The materials are not corrosive and carbon steel equipment is suitable. An agitator should be provided.

All of the additives dissolve easily in Santicizer 140 or Santicizer 711. A suggested procedure is to blend the Santicizer 140 and 711, add the tolyltriazole, Paraplex G-62, Santolube 70-A, DC-200, and dye, and mix for 1/2 to 1 hour at 125-150°F. (50-65°C.).

The dye should be carefully measured on a suitable scale or balance and added as a solid to the batch. Note: relatively small changes in dye concentration or incomplete mixing can cause batch-to-batch color variations.

The rest of the additives should also be measured carefully as they will affect the acidity and appearance specifications of the blend.

Aroclor 5432 is a resinous, sticky solid at room temperature. It may be handled easily if it is heated to 150-180°F. (65-82°C.). At 150°F. viscosity is 100-400 cs. and at 180, 40-100 cs.

It is suggested the blend be warmed to 125-150°F. (50-65°C.) and agitation continued for sufficient time to insure complete component mixing. Thirty minutes to one hour should be sufficient. Lower blending temperatures may be used if experience indicates satisfactory mixing. Heat from molten Aroclor 5432 may be sufficient to raise batch temperature. The batch is then circulated through a polishing filter. Samples are taken

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as required for analytical purposes. The batch may be held for possible viscosity adjustment or be sent to storage. After blending is complete, it is recommended that the temperature be reduced to 80-129°F. (26-49°C.). Prolonged exposure at higher temperatures may cause some product quality deterioration.

DISCUSSION OF IMPORTANT VARIABLES

The most important specification property of Pydraul A-200B is viscosity. Adjustments in the blend should be made to keep the 100°F. viscosity within the required specification range.

If the 100°F. viscosity is low, add Aroclor 5432. One pound of Aroclor 5432 per 100 pounds of blend will increase the 100°F. viscosity about 1.5 centistokes.

If the 100°F. viscosity is high, add Santicizer 140. One pound of Santicizer 140 per 100 pounds of blend will decrease the 100°F. viscosity about 1.0 cs.

Another caution mentioned in the previous section concerned prolonged heating. It is suggested that maximum temperatures of 125-150°F. be limited to 2 or 3 hours. Also, manner of heating the batch should control film temperatures so there are no significant hot spots. Prolonged heating may cause gradual darkening of the product as well as gradual increase in acidity.

MATERIAL SPECIFICATIONS

Raw Materials

Refer to raw material specification sheets included in the Appendix.

Finished Pydraul A-200B

Typical analyses and suggested specification limits follow:

Property	Tentative Specification	Typical Value	JFQ Method
Appearance	Clear to slightly hazy liquid		16-B
Viscosity, cs.			
at 100°F.	34-38	36.1	126-A
at 210°F.	4.2-4.6	4.38	
Acidity, mg. KOH/gm.	0.30-0.60	0.45	80-B

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Property	Tentative Specification	Typical Value	JFQ Method
Specific Gravity 25/25°C.	1.19-1.22	1.207	116-A
Moisture, KF	0.15 max.	0.02	78-B
Pour Point (each 10th lot)	-5°F.	-10°F.	100-A

ANALYTICAL METHODS

No new or special analytical procedures are required for this product. A cross reference table appears in the Appendix listing standard analytical procedures used at J. F. Queeny Plant, W. G. Krummrich Plant, and at the Anniston Plant. These procedures are currently used on similar products.

TOXICITY AND HAZARDS

No unusual toxicity or hazards are expected with the raw materials or finished blend. The process is a simple blending procedure and no hazardous reactions should occur between the various components.

Aroclor 5442 and Santicizer 140 have been known materials produced by Monsanto for many years. Santicizer 140 has been used in Pydraul fluid formulations. (Note: Current specific toxicity information is being obtained from the Medical Department on these materials and it is suggested these be included in the Appendix of this report.)

General precautions include the following:

1. Goggles should be worn where splashing or spillage may occur.

2. Any material in contact with the skin should be removed by washing with soap and water.

3. Prolonged or repeated exposure to the skin may cause irritation due to removal of skin oils with resulting dryness and chapping.

4. Material may be irritating to sensitive skin areas and eyes. In case of contact with eye tissue, flush copiously with water and then get medical attention.

5. In case of internal ingestion get immediate medical attention.

6. Avoid inhaling volation material or mists.

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POLLUTION CONTROL

No waste by-products are generated by this process. Used filtering material, flushings from the system during cleaning, as well as any spoiled product should be disposed of as dictated by local regulations.

APPENDIX

P. D. Fowlkes

P. D. Fowlkes

L. R. Stark

L. R. Stark

File Copy Approved by:

W R Richard — 11/12/70
Manager of R&D — (date)

J R Savage — 11/13/70
Manager of Manufacturing — (date)

Oliver D. Gannie — 11/16/70
Manager of Process Technology — (date)

/is
11/11/70

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Analytical Procedures

Property	WGK	JFQ	Anniston	ASTM *
Appearance	12809	16-B	G-1	-
Viscosity	12837	126-A	049	D-445
Flash & Fire Point	12803	50-A	114	D-92
Specific Gravity	12804	116-B	052	-
Pour Point	13005	100-A	053	D-97
Cloud Point	-	36-A	-	D-2500
Acidity	12794	80-B	050	D-664/D-974
Moisture	12810	78-B	047	D-1744
Foam	12805	54-A	-	D-892
Refractive Index	13123	104-A	048	D-1218
Distillation Range	10117	-	054	Modified D-20

* Approximate equivalent ASTM method.

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MONSANTO COMPANY
ORGANIC CHEMICALS DIVISION
J. F. QUEENY PLANT
FINISHED PRODUCT SPECIFICATION

PRODUCT CODE: 80077/80151
DEPT. OR JOB:
USE: Sales - W.F.Waychoff, Manager and Internal for blends
SALES CODE: 7680-910-04-001

ISSUED JAN. 23, 1967
STANDARDS DEPARTMENT
John F. Queeny Plant
Paul N. Bruce

PRODUCT (Trade Name): SANTICIZER 140
TYPE: A GRADE

PRODUCT (Chemical Name): CRESYL DIPHENYL PHOSPHATE
TYPE: A GRADE

CHEMICAL FORMULA

MOL WT.

SUPERSEDES SPECS OF: November 26, 1963

SAMPLE FOR ANALYSIS: 1 x 16-ounce NN Flint Bottle

TEST	UNRESTRICTED SALES LIMITS	CONTROL LIMITS	METHODS
On each lot			
Acidity	0.20 meq/100 g. max. (=0.01% max. as H_3PO_4)	0.15 meq/100 g. max.	4-A
Appearance	Clear, mobile liquid	Clear, mobile liquid	16-B
Color	APHA 40 max.	APHA 15 to 35	38-D
Moisture (By KF in methanol)	0.15% max.	0.12% max.	78-B
Odor	Essentially odorless	Essentially odorless	84-A
Specific gravity @ 25/25°C	1.203 to 1.213	1.205 to 1.208	116-B
Stability to $KMnO_4$	65% transmission, min.	65 to 90% transmission	118-D
Upon request			
Refractive index @ 25°C	1.550 to 1.570	1.558 to 1.563	104-A

Sampling procedure

1. Circulate storage tank the night before filling shipping containers.
2. While filling drums or tank car, take one 16-ounce bottle from the filling line and submit to the laboratory for analysis.

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MONSANTO COMPANY
ORGANIC CHEMICALS DIVISION
EVERETT PLANT
FINISHED PRODUCT SPECIFICATION

PRODUCT CODE: 86848
DEPT. OR JOB:
USE: Sales and internal
SALES CODE: 3960-300-04-011

ISSUED Dec. 26, 1969
STANDARDS DEPARTMENT
John F. Queeny Plant
By W. L. Sammons

PRODUCT (Trade Name): SANTICIZER 711 — TYPE:
PRODUCT (Chemical Name): — TYPE:
CHEMICAL FORMULA:
MOL WT.

SUPERSEDES SPECS OF: January 9, 1969 (Tentative)
SAMPLE FOR ANALYSIS: 1 x 16 ounce NN Bottle

TEST	UNRESTRICTED SALES LIMITS	INTERNAL CONTROL LIMITS	EVERETT PROCEDURES
On each lot			
Acidity, meq/100 grams	0.12 maximum	----	801-01-03
Appearance	Clear, oily liquid	----	600-01-02
Color	APHA 50 maximum	----	801-01-04
Moisture (By KF in methanol)	0.10% maximum	----	801-01-02
Odor	Slight, characteristic	----	600-15-01
Refractive Index @ 25°C	1.480 to 1.483	----	600-18-01
Specific Gravity @ 25/25°C	0.965 to 0.973	----	801-01-05
Upon request			
Composition:			GLC
Low boilers including alcohols		0.8% maximum	
Plasticizers other than Santicizer 711		1.5% maximum	

Sampling procedure

1. Tank Cars or Trucks

   a. Take one or two 16-ounce dip samples, as per plant practice, after tank or car is filled.
   b. Submit one bottle to the laboratory for analysis. When a spare is taken, hold in the department for reference.

2. Drums

   a. Withdraw a thief sample from every fifth drum and composite to give one or two 16-ounce bottles, as per plant practice.
   b. Submit one bottle to the laboratory for analysis. When a spare is taken, hold in the department for reference.

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MONSANTO
ORGANIC CHEMICALS DIVISION

TENTATIVE SPECIFICATION

ARCOLOR 5632		823.17
PLANT: Anniston	PRODUCT CODE: 82621	USE: Sales
DATE EFFECTIVE: 7/15/70	SALES CODE:	
AUTHORIZED BY: J. L. Corder	SOURCE OF SPECIFICATION: Research	

GENERAL DESCRIPTION

CHEMICAL FORMULA

CHLORINATED TERPHENYL

HOLDING ISSUE	EFFECTIVE UNTIL	SAMPLE FOR ANALYSIS	ISSUED BY
1	1/15/71	1 x 1/2 gal. Bottle	J. T. Bell

CHARACTERISTIC	LIMITS	METHOD
(R) Color, NPA	2 Max.	G-4
(R) Specific Gravity @ 90°C	1.263-1.290	052
(R) Appearance	Clear Yellow Oil	G-1

GENERAL INFORMATION

Chlorine Content, %	30.5-33.0	093

DSW 620280

(R) Routine Analysis. All others Analyzed by request only.

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MONSANTO COMPANY
ORGANIC CHEMICALS DIVISION

J. F. QUEENY PLANT
RAW MATERIAL
SPECIFICATION

~~81787~~ 81851

USING DEPTS
Fluid Blends

SUPPLIER
Monsanto - Nitro Plant

ISSUED MAY 9, 1968
STANDARDS DEPT.
J. F. Queeny Plant
By Paul R. Bissell

MATERIAL
SANTOLUBE 70-A

CHEMICAL FORMULA

Blend of:	Santolube 70	98.35%
	Santolene C	1.65%

MOL. WT.

SUPERSEDES SPECS OF 6-21-67 for Santolube 70; Nitro code 81787

SAMPLE FOR ANALYSIS
1 x 16-ounce WM Bottle

TEST	RESTRICTED INTER-PLANT LIMITS	PROCEDURES NITRO	PROCEDURES JFQ
On each lot			
Appearance	Dark, oily liquid	6-C-01	16-B
Color. ASTM Dilute	5.5 max.	6-C-21	38-I
Neutralization No.	51 to 61	6-A-24	80-A
Solubilities: 5%/vol. in PE	Clear	6-V-15	112-B
Specific gravity @ 25/25°C	0.89 to 0.97*	6-D-07	116-B
Upon request			
Emulsification test	40, 40, 0 (30 min.)	6-S-28	-- --
Santolene C presence	Positive phosphorous test	-----	-- --
Viscosity @ 210°F	70 to 300 SUS*	6-X-02	126-A

*Typical ranges submitted by Nitro.

Special requirements

This material is shipped upon invoice certification of compliance with specifications. Prior permission will be obtained to ship non-specification grade material.

This specification is the property of Monsanto
and is intended for internal use only.

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MONSANTO CHEMICAL COMPANY
ORGANIC CHEMICALS DIVISION

RAW MATERIAL SPECIFICATION

MATERIAL CODE: 46310

USING DEPTS.: Santicizer Blends

SUPPLIER: Rohm & Haas

ISSUED OCT. 18, 1965
STANDARDS DEPT.
John P. [illegible]
By Paul [illegible]

MATERIAL: PARAPLEX G-62

CHEMICAL FORMULA: -----

MOL WT. -----

SUPERSEDES SPECS OF: September 7, 1962

SAMPLE FOR ANALYSIS: 1 x 16-ounce NN Bottle

TEST	UNRESTRICTED PURCHASE LIMITS	INTERNAL CONTROL LIMITS	PROCEDURES
On each lot			
Appearance @ 30°C	Sparkling clear	----	16-B
Color	Gardner #1 max.	----	38-N
Neutralization No.	Acid. 1.0 max.	----	80-B
Refractive index @ 25°C	----	1.469 to 1.473	104-A
Specific gravity @ 25/25°C	----	0.988 to 0.998	116-A
Upon request			
Iodine number	About 0.7 to 0.8	----	68-C
Viscosity @ 25°C (Gardner-Holt)	M to Q	----	126-D
Product information - Typical Analysis			
Flash point	315°C		
Freezing point	+5°C		
Oxirane oxygen	6.7 to 6.8 (6.5 min.)		
Refractive index @ 25°C	1.471		
Saponification number	182		
Specific gravity @ 25/25°C	0.993		

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IN 27
RM

MONSANTO COMPANY
ORGANIC CHEMICALS DIVISION
J. F. QUEENY PLANT
TENTATIVE
RAW MATERIAL SPECIFICATION

MATERIAL CODE: 60015
USED IN: Pydraul Blends
PROPOSED BY: P. D. Fowlkes

DISTRIBUTION
R. L. Wagner - 1 - JFQ
P. F. Gatens - 1 - JFQ
R. A. Geisman - 4 - JFQ
J. D. Leyerle - 1 - JFQ
H. L. Powell - 1 - JFQ
N. T. Johnson - 1 - GO/B2S
J. R. Savage - 1 - GO/B2N
B. Petty - 1 - GO/B2N
P. D. Fowlkes - 1 - GO/Res.
L. R. Stark - 1 - GO/Research
Standards - 4 -

NAME
TOLYLTRIAZOLE (Cobratec TT-100)

CHEMICAL FORMULA

MOL. WT.

DATE PROPOSED	EFFECTIVE UNTIL	SUPPLIER	SAMPLE FOR ANALYSIS
4/30/70	4/30/71	Sherwin Williams	1 x 8-ounce WM Bottle

NOTE: All samples processed by this tentative specification will require disposition of the authorized releasing agent.

TESTS	LIMITS	PROCEDURES
Appearance	Light tan granules	16-A
Melting point	81 to 84°C	76-A

Product information

Bulk density	40 - 45 lbs. /ft.^{3}
Screen test:	
Retained on 6 mesh	0%
Retained on 60 mesh	99%
Solubility @ 25°C (by wt.)	
Benzene	1.7%
Ether	23.0%
Methanol	92.5%
Polyethylene Glycol	53.3%
Water	1.03% (1.90% @ 60°C)
Water	0.7% maximum

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MONSANTO COMPANY
ORGANIC CHEMICALS DIVISION

RAW MATERIAL SPECIFICATION

31100

USING DEPTS.
Fluid Blends

SUPPLIER
Dow Corning Corporation

ISSUED FEB. 8, 1968
STANDARDS DEPARTMENT
John B. Cassey Sr.
Paul N. Rivers

MATERIAL
DOW CORNING 200 FLUID - 350 cs.

CHEMICAL FORMULA

MOL WT.

SUPERSEDES SPECS OF
October 28, 1964

SAMPLE FOR ANALYSIS
1 x 8-ounce Bottle

TEST	UNRESTRICTED PURCHASE LIMITS	METHODS
On each lot		
Appearance	Syrupy liquid	16-B
Refractive index @ 25°C	1.4020 to 1.4040	104-A
Specific gravity @ 25/25°C	0.969 to 0.975	116-A
Viscosity @ 25°C	332.5 - 367.5	126-31100
Upon request		
Color - modified Barrett	1.5 max.	38-H
Flash point	600°F min.	50-A
Neutralization No.	0.01 max.	80-B
Volatility (24 hrs. /150°C)	0.5% max.	128-B

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IN 53 (REV. 12/63)

STLCOPCB4094311

IN 619

PHYSICAL CONSTANTS DATA

SUBSTANCE	STRUCTURAL FORMULA
PYDRAUL A-200B (MCS 1067)	59.3% Santicizer 140 10.0% Santicizer 711 30.0% Aroclor 5432 0.3% Santolube 70-A 0.3% Paraplex G-62
COMPILED BY: P. D. Fowlkes	DATE: 11/11/70

NAME		SOURCE & DATE
Formula		
Molecular Weight	Blend	
Appearance	Blue Liquid	
Boiling Point at 760 mm		
Boiling Point at mm		
Boiling Point at mm		
Boiling Point at mm		
Crystallizing Point	None	
Melting Point	None	
Solution Point		
Specific Gravity @ 25/25°C.	1.207	
Specific Gravity @		
Pounds per Gal. @ 25°C	10.07	
Coefficient of Expansion		
Refractive Index @ n_D		
Infra Red Spectrum *(Reference)*		
Ultra Violet Spectrum *(Reference)*		
Viscosity @ 100°F.	36.08 cs.	
Viscosity @ 210°F.	4.38 cs.	
Surface Tension		
Solubility in Water	Nil	
Solubility in		
Solubility in		
Flash Point °F *(Method)* COC	470	
Fire Point °F	650	
Heat of Combustion		
Heat of Formation		
Thermal Stability (cal./kg/min.)		
Latent Heat of Fusion		
Latent Heat of Vap.		
Specific Heat		
Critical Temperature		
Critical Pressure		
Dissociation Constant		
Other Constants		
Toxicity *(Give Reference)*		

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