Monsanto

FROM (NAME & LOCATION): B2SC Cumming Paton

February 14, 1972

SUBJECT: Trip Report

REFERENCE

TO : F I L E

B2SL H. S. Bergen/W. R. Corey
B2SL T. K. Gossage
1010 E. L. Shimley
B2SF N. T. Johnson
T3F D. R. Miller
B2SC J. J. Roden/D. E. Roush
B2SD P. W. Gann
J. R. Creager, Goodyear

COMPANY CONTACTED: Goodyear Tire & Rubber
Akron, Ohio

DATE: February 4, 1972

FOR GOODYEAR:
J. R. Creager, Dir. of Manufacturing
D. C. Goodland, Mgr. Chemical Plants Engineering
F. Tully, Director Mfg. Services
V. L. Peterson, Purchasing
R. Collins, Purchasing
M. T. Bucci, Plant Mgr. (Point Pleasant)
J. Coonen, Plant Engr (Point Pleasant)
J. Mally, Mgr. Polyester R & D
E. O. Wuerch, Mfg. Superintendent
E. J. Burkett, Corporate Engineering
B. C. Johnson, Corporate Engineering
R. M. Orbal, Corporate Engineering
C. Hiss, Corporate Engineering

FOR MONSANTO:
T. L. Gossage, Marktg. Director, Specialty Products
E. L. Shimley, Regional Manager
D. R. Miller, Research Group Leader
D. E. Roush, Heat Transfer Specialist
C. Paton, Product Manager

Introduction

This was the third visit made by the writer (Paton) to Goodyear concerning the conversion of the heat transfer system at the Point Pleasant polyester plant from Therminol^{R} FR-1 to a non-PCB fluid.

December 30, 1971

Visit to Akron where Jack Creager outlined high cost and other problems if plant were shut down in order to drain and change FR-1. At that time Goodyear asked us to evaluate the feasibility of sequential dilution of FR-1 by a non-PCB fluid (e.g. Therminol 66).

January 13, 1972

Visit made to Point Pleasant plant to clarify heat transfer lay-out so that feasibility of conversion methods could be carried out.

Objectives 2/4/72 Visit

1. To present Monsanto's opinion of possible conversion methods based on Goodyear's input.

2. To determine if Goodyear thinks any of Monsanto's evaluations have enough merit to warrant further study.

3. If #2 is yes, which conversion method should be pursued and what needs to be done in order for Goodyear to reach a final decision.

Monsanto Presentation

Monsanto had considered three possible conversion methods:

Method	Major Disadvantages
1. Complete drain and refill.	Lost production. Thermal shock to reactors Cost estimate ~ 1.5-2 M(Goodyear)
2. Incremental drain/top-up with Therminol 66. (Gradual dilution of FR-1)	Short life of FR-1/66 blends Unable separate FR-1/66 High refill fluid cost
3. Incremental drain/top-up with Therminol 55 - complete dilution with Therminol 66.	Short life FR-1/55 blends Short life Therminol 55>600°F

#1 and #2 were essentially Goodyear's proposals. #3 was a modification of #2, chosen because any dilution method requires a large volume of fluid and Therminol 55 is almost ¢2/gallon cheaper than Therminol 66. Furthermore the non-PCB fluids and FR-1 have overlapping boiling ranges making it impossible to separate FR-1 from the non-PCB fluid so that the latter could be re-used. Goodyear has experience of Therminol 55 at its Scottsboro, Alabama plant.

Monsanto presented in greater detail a possible conversion procedure for #3.

Subject to Goodyear acceptance, Monsanto envisaged the following steps for method #3:

a) Installation of dump tanks and other safety equipment arising from Goodyear's discussions with their insurers.
b) Conversion method dependent on thorough blend life studies of FR-1 blends with Therminol 55 and/or 66.
c) Segregation of the system (as it already is) into two parts: ~ 80,000 and ~ 60,000 gallons.
d) Dilute 80 M gallon system with 20 M gallon lots of Therminol 55
   - incineration of FR-1-rich drained material
   - usage of Therminol 55-rich drained material to dilute 60 M gallon system.
   - convert from Therminol 55 to 66 when FR-1 content around 5-8%.
   - dilute to ~ 2% FR-1 with Therminol 66.

e) Dilute 60 M gallon system with Therminol 55 and 66 rich fluid drained from 80 M gallon system.

- incinerate all fluid drained from 60 M gallon system

f) Estimated time between charges of non-PCB fluid around 2-6 weeks making a total conversion time of 2½ years. (Trying to spread out cost to Goodyear).

g) Without taking back-mixing into account new fluid consumption estimated at:

Therminol 55	: 220 M gallons
Therminol 66	: 140 M gallons
Total	360 M gallons

Monsanto (D. R. Miller/D. E. Roush) presented stability data on FR-1/Therminol 55, FR-1/Therminol 66 and 3-component blends at 620°F for seven days under a nitrogen blanket. (These tests are continuing).

Goodyear's Response

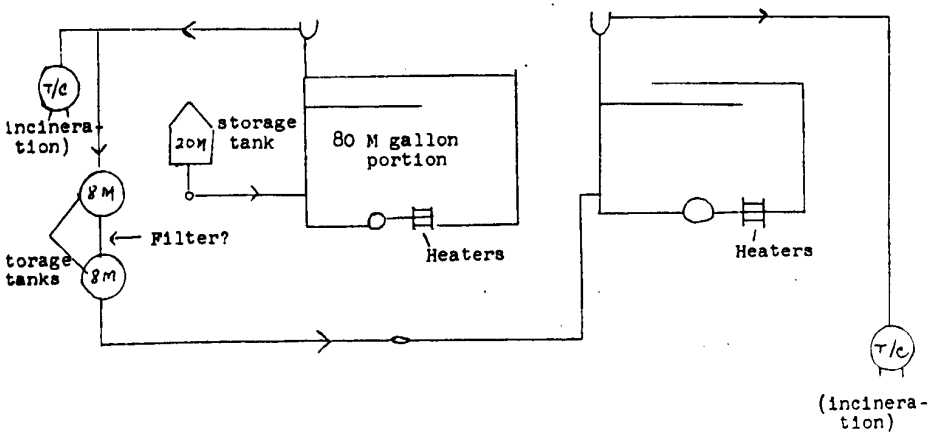
1. Goodyear is six months away from beginning actual change of FR-1 due to time needed to install dump tanks and other safety equipment.

   (Jim Coonen later called me to say six months was minimum with nine months a probability).

2. Goodyear still lean to a dilution of FR-1 with a suitable non-PCB. They were willing to study use of Therminol 55 as the "starting" fluid and the idea of using drained fluid (non-PCB rich) to dilute the other half of their system was of interest.

3. Goodyear very quickly ruled out dilution over a 30 month period. They want conversion once begun to proceed as fast as possible.

4. Jim Coonen outlined the following conversion method.



a) Input of non-PCB fluid from 20 M gallon storage tank into 80 M gallon portion at minimum of 10 and maximum of 50 gallons/minute.

   This means dilution of FR-1 at rate of 14-72 M gallons/day.

b) Pumping is around 1000 gallons/minute within heat transfer system creating high degree of mixing (hence not diluting FR-1 in outlet fluid as quickly as would be the case at slower mixing rates).

c) Initial outlet fluid from 80 M gallon portion would be drained to T/Cs for subsequent incineration.

d) As non-PCB content of drained fluid gets to around 75-80% it will be fed to 60 M gallon portion via one or two 8 M gallon tanks at a rate of 10-50 gpm.

e) Filtration was considered between the two "halves" of the heat transfer system to prevent debris being circulated.

f) Goodyear might start at 50 gpm rate and back off to 10 gpm. (They want to minimize thermal shocks to the system.)

5. Goodyear data so far on FR-1/Therminol 66 blends shows "they are out of the woods at 60% Therminol 66".

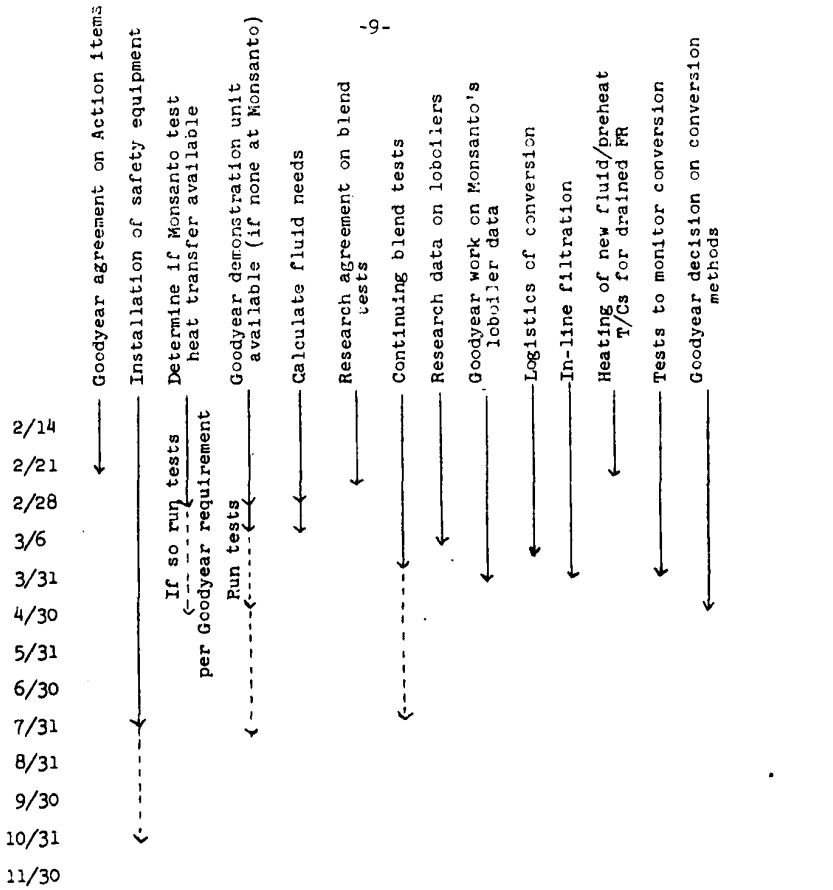
6. Goodyear want Monsanto to investigate feasibility of Monsanto having a plant heat transfer system where dilution of FR-1 with 55/66 could be demonstrated. Alternatively Goodyear may be able to use a pilot plant unit.

7. Monsanto/Goodyear need to recalculate fluid requirements for dilution on basis of Jim Coonen's proposed method (assuming perfect mixing).

Actions Required

Communication Line	Action Item
1. C. Paton/J. Creager	Availability of Monsanto unit to test FR-1/55-66 dilution.
	If yes, CP outline proposed program to JC.
2. (If #1 is possible) J. Coonen/D. E. Roush	Goodyear furnishes Monsanto with data required from such a demonstration.
3. D. R. Miller/J. Mally	Agreement on laboratory tests for FR-1/55 and/or 66 blends.
	Goodyear/Monsanto to continue blend tests.
4. Goodyear	Establish engineering budget.
5. D. R. Miller/J. Mally	Isolate and quantify loboilers from FR-1 blends with Therminol 55 and 66.
	A.I.T. characteristics of loboilers.
6. Goodyear	Installation of fire protection equipment/dump tanks, etc.
7. C. Paton/J. Creager	Estimate of fluid volume required for dilution to 10, 5 and 2% FR-1 per J. Coonen proposal. (Should be carried out by both Goodyear and Monsanto engineering).
8. D. E. Roush/J. Coonen	Investigate in-line filtration to remove debris.
9. D. E. Roush/E. J. Burkett	Investigate expansion tank loboilers - quantity/precautions re flammability and explosion limits.
10. D. E. Roush/J. Coonen	Preheating of non-PCB fluid - steam heating of coiled T/C - skid-heater at Point Pleasant - ship heated fluid

11.	C. Paton/M. T. Bucci	Meeting at Apple Grove to discuss logistics of conversion.
12.	Monsanto	Handle incineration of 400-500 M gallons of fluid.
13.	D. R. Miller/J. Mally	Monitoring change-over - fluid decomposition - FR-1 content - system capacity
14.	D. E. Roush/J. Coonen	Portable distillation at Apple Grove or Anniston (if degradation during conversion was greater than present side-stream still could handle).



On this time-table, actual change-over of FR-1 could begin in August at the earliest. If delayed we will run into fall/winter weather which could create problems.

Future meetings will be set up as approrpiate.

Cumming Paton

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