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STANDARD PROCEDURE

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634.32 Recording of Batch Data

Record indicated operational and raw material charge and lot number data on the following forms:

1. Opalon Paste Kettle Operating Log #MS 3009.
2. Opalon 440 Dual Condenser BTU Rate Schedule #MS 3853.
3. Opalon 440 Emulsifier Addition Schedule #MS 3855.
4. 84 Building Polymerization Shift Summary.

See examples in Section 634.38.

634.33 Opalon 440 Formulation

The 440 product latex formulation varies with (a) seed latex particle size, (b) seed latex total solids and (c) seed latex batch size. The generalized formulation is as follows:

Raw Material	Amount
a. Water	Variable (Table A)
b. Seed	Variable (Table A)
c. Initial Emulsifier (Dup. WAQM or Sipex SM)	Variable (Table D)
d. Salt (Sodium Metabisulfite)	13 lb. 10 ounces
e. Initial Ammonia (29% Soln.)	750 ml.
f. VCM I	Variable (Table B)
g. Catalyst (Ammonium Persulfate)	2 lb. 8 ounces
h. VCM II	Variable (Table C)
i. Emulsifier ... (1) Neofat 12	124 lbs.
(2) Ammonia (29% Soln.)	365 lbs.
j. Caustic	4 lbs.

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634.34 Raw Material Preparation

1. Based on the seed particle size, total solids and batch size, record on the log sheet #MS 3009 the following charges.

- (a) Water ... Gals. (Table A)
- (b) Seed ... Lbs. (Table A)
- (c) Initial Emulsifier ... Lbs. - oz. (Table D)

2. Catalyst Solution

- a. Dissolve 2 lbs. 8 oz. of catalyst (Ammonium Persulfate) in 170 gallons (39 inches) of filtered cold water in the catalyst premix tank (Break lumps by hand while adding catalyst to the tank).
- b. Agitate until completely dissolved (approximately 15 minutes).

3. Scheduled Emulsifier Solution

The scheduled emulsifier solution will normally be prepared as soon as possible after the completion of the emulsifier charge to the preceding batch. The preparation of the solution will be deferred if there is any anticipated maintenance or operational problem that will delay kettle charging. The emulsifier solution will precipitate a jelly-like material that will plug the filters and pump if the solution becomes too cold (about 21°C) due to being prepared too far in advance.

- a. Open the damper in the ventilating duct above the premix tank and start the emulsifier tank ventilating fan. This fan is to be left running at all times during a 440 polymerization run.
- b. Open the valve in the ammonia charge line above the appropriate premix tank and start the ammonia charge pump.

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634.34 Raw Material Preparation (Cont'd.)

3. Scheduled Emulsifier Solution (Cont'd.)

- c. Note the ammonia temperature on the thermometer in the transfer line. The volume of the ammonia charge is corrected for temperature according to the following table:

<u>Temperature</u>	<u>Volume of Ammonia Charge</u>
Less than 41°F	48 gallons
41-86°F	49 gallons
Above 86°F	50 gallons

- d. Gradually close the valve in the ammonia charge line as the level in the tank approaches the correct charge. This is necessary to prevent an over charge. Shutoff the valve and then stop the pump when the correct level has been reached.
- e. Charge filtered process water to bring the level in the premix tank up to 115 gallons. The water charge temperature must be adjusted for variations in ammonia solution temperature as follows:

<u>Ammonia Temperature</u>		<u>Water Temperature</u>
°F	or °C	°C
14-31	-10-0	61
32-48	1-9	54
49-65	10-18	49
66-82	19-28	42
83-91	29-32	38

- f. Charge specified weight of Neofat 12 to the premix tank.
- g. Agitate until thoroughly mixed, approximately 45 minutes.
- h. After the Neofat has been completely dissolved, align piping to recirculate the solution through the scheduled emulsifier charge pump and back to the tank. Run the pump on high speed until the system is full and then put on slow speed. Continue recirculation until ready to charge. Solution temperature should be $35^{\circ}\text{C} \pm 3^{\circ}\text{C}$ when it is first recirculated.

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634.34 Raw Material Preparation (Cont'd.)

4. Initial Emulsifier Solution

Add the specified amount of Duponol WAQM to 1 gallon of 50°C water in the initial emulsifier premix pail.

5. Salt Solution

Dissolve the 13 lbs. 10 ounces of salt (Sodium Metabisulfite) in 50 gallons of cold, filtered water in the salt premix tank. Agitate until dissolved, about 3.5 minutes. Add 750 ml ammonia solution to the salt solution using the measuring sight glass.

Note: Wait until the kettle is being vacuum purged before making up the salt solution, since the salt solution must be charged to the kettle within 10 minutes after make-up; otherwise, the salt solution must be sewered and a fresh solution prepared.

6. Caustic Solution Preparation

- a. Charge 40 gallons of cold water to the caustic mix tank.
- b. Add 4 pounds of flake caustic to the dissolving cone in the tank.

It will take about 5 minutes to dissolve the caustic. This solution should be prepared so that it will be ready to immediately follow the final emulsifier charge to the kettle.

Safety

Caustic is a very hazardous material. The following safety precautions must be observed.

1. Rubber gloves, rubber apron, chemical goggles and face shield must be worn when handling caustic.
2. Caustic must be handled in closed containers. When on the kettle floor, the covers must be tightly secured.

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6. Caustic Solution Preparation (Cont'd.)

Safety (Cont'd.)

3. All equipment must be thoroughly flushed with cold water after every use.
4. Wash down all spills immediately with large amounts of cold water.

634.35 Preparation of Kettle

1. Before any batch is charged the kettle must:
 - a. Be free from excessive buildup on the walls, agitator, baffle or thermowell and,
 - b. be pressure tested according to 631.00 if any flange has been opened on the kettle or on a charge line between the kettle and the first block valve.
2. When the kettle has been properly cleaned and pressure tested:
 - a. Open the reflux condenser cooling water valve and close the by-pass valve.
 - b. Start the Duraseal Unit (including cooling water) and check seal pressure (180-225 psi).
 - c. Turn on the jacket make-up water valve and the steam to the jacket water heater.
 - d. Start the kettle jacket recirculating pump.
 - e. Set the batch TRC on manual and adjust the jacket temperature to 54°C.
 - f. Check to see that all the kettle charge, vent, and dump valves are closed.
 - g. Place condenser by-pass station on "automatic".
 - h. Place the condenser selector switch in the "Normal" position.

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634.36 Batch Charging and Reaction Control

1. Process Water Charge:

- a. Charge kettle with specified amount (Table A) of filtered hot water (53-54°C) by aligning flow through the heater and water meter.
- b. Control the jacket set point manually to maintain batch temperature at 54°C + 1°C. This temperature must be maintained through the vacuum purge.

NOTE: At the end of the water charge, relieve line pressure by opening the drain valve.

- c. Start the kettle agitator on low speed.

2. Seed Charge:

- a. Agitate the seed tank on slow speed for 3-5 minutes.
- b. Transfer the specified amount (Table A) of seed from the seed hold tank to the seed weigh tank using the seed transfer pump.
- c. After 100 gallons of the water charge has been added to the kettle, start transferring the seed from the weigh tank to the kettle.
- d. When the seed transfer to the kettle is complete, add 200 lbs. cold water to the seed weigh tank through the flush nozzle. Charge this water to the kettle.

3. Initial Emulsifier:

Add directly to the kettle the initial emulsifier premix solution (Table D). Thoroughly flush the initial emulsifier solution pail into the kettle.

4. Vacuum Purge:

- a. Drain the water in the vacuum line knockout tank to the sewer and then close the drain valve.

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634.36 Batch Charging and Reaction Control (Cont'd.)

4. Vacuum Purge: (Cont'd.)

- b. Open vacuum system to the top of one condenser.
- c. Close kettle manhole and bolt down with 16 dogs.
- d. Put kettle agitator on high speed.
- e. Draw a 24-inch vacuum on the kettle. If mechanical problems will not permit reaching the level, the bisulfite may be charged when at least 20" Hg vacuum is attained.
- f. Close the kettle vacuum line valves.

NOTE: Care must be exercised not to break the vacuum purge except with the VCM charge. If, however, this should happen, do the following:

- a. If it is before the salt addition, repurge.
- b. If it is after the salt addition, dump the batch to the sewer and start over.

5. Salt Charge:

- a. At the end of the vacuum purge, draw the salt solution into the reactor. Watch the sight glass in the charge line for air bubbles. Regulate flow to prevent air from entering the kettle. Leave a heel of 1-2 gallons in the salt premix tank to prevent a loss of vacuum.
- b. Flush the premix tank with 5 gallons of filtered cold water. Draw this into the kettle, again exercising care not to allow air into the system. Leave a 1-2 gallon heel in the premix tank which will be flushed to the sewer
- c. The VCM I charge must start within 2 hours of the completion of the salt charge. If more than 2 hours has elapsed, the kettle must be dumped and recharged.

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634.36 Batch Charging and Reaction Control (Cont'd.)

6. VCM I Charge:

- a. Check all kettle valves to be sure they are closed.
- b. Start the charge slowly, 15-20% of maximum rate, until the kettle pressure reaches 20 psi. Complete rest of charge at 80-90% of maximum rate.
- c. Determine the VCM temperature by reading thermometer in the VCM line. Use this and the seed particle size to determine the gallons of VCM to charge using Table B.
- d. Control the jacket TRC set point manually to reach a batch and jacket temperature of $50^{\circ}\text{C} \pm 1/2^{\circ}\text{C}$ at 100 gallons of the VCM I charge.
- e. At $50^{\circ}\text{C} \pm 1/2^{\circ}\text{C}$, set the batch TRC on automatic, controlling the batch temperature at $50^{\circ}\text{C} \pm 1/2^{\circ}\text{C}$.

7. Catalyst Charge and Reaction Rate Control:

- a. The catalyst charge should start when the batch and the jacket temperature are both $50^{\circ}\text{C} \pm 1/2^{\circ}\text{C}$ and the TRC is on automatic. This should be about 5 minutes after the start of the VCM-I charge.
- b. Align the piping to the kettle. Start the catalyst charge pump and then open the valve at the kettle. Zero the BTU meter integrator.
- c. Bleed the reflux condensers at a low rate, 1.0 to 1.5 units (cfm) on the vent rotometers.
- d. Start the catalyst charge at the high cam rate. Adjust the rate as necessary with the Reaction Programmer Cam to maintain the reaction along the program curve for 440 latex manufacture, Form #MS 3853. Record BTU meter integrator readings and time on the form every 20 minutes until the end of the heatkick.

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634.36 Batch Charging and Reaction Control (Cont'd.)

7. Catalyst Charge and Reaction Rate Control: (Cont'd.)

d. (Cont'd.)

1. Use Graph 1 on MS 3853 from the start of the catalyst to the start of the scheduled emulsifier charge. The emulsifier is started when the BTU reading reaches the level specified in Table E.
2. When the scheduled emulsifier charge is started (see Section 7 below), the BTU meter is zeroed and then the catalyst charge rate is adjusted to maintain the reaction rate shown on Graph 2 of MS 3853.

8. Scheduled Emulsifier Addition:

- a. The start of the scheduled emulsifier varies with seed size. The BTU integrator readings at the start of the scheduled emulsifier are tabulated in Table E, Section 634.38.
- b. Stop the catalyst pump 100 BTU integrator units before the start of the scheduled emulsifier to prevent too high a reaction rate when the scheduled emulsifier is charged.
- c. To start the scheduled emulsifier, close the valve in the recirculating line and open the valve to the kettle at the proper BTU integrator reading. (Re-zero the BTU meter at this time).
- d. Set the emulsifier programmer cam to the start point.
- e. Check the sight glass to be sure flow has started.
- f. Control the charging rate with the emulsifier programmer cam to follow the scheduled program shown in MS 3855. Record the tank level in gallons on MS 3855 every 500 BTU units.
- g. Continue the charge schedule up to 6400 BTU I.U.

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634.36 Batch Charging and Reaction Control (Cont'd.)

8. Scheduled Emulsifier Addition: (Cont'd.)

- h. At 6400 BTU I.U., reduce the programmer cam to minimum position (27%) and charge at this rate through the start of the final emulsifier charge.
- i. The emulsifier schedule on MS 3855 must be followed within the three parallel lines.

9. VCM II Charge:

- a. The VCM II charge is started shortly after the beginning of the scheduled emulsifier addition. Start the VCM II charge through the rotameter at the BTU integrator reading specified in Table E, Section 634.38. Control the rate at 50% of maximum rotameter scale to complete the charge in 1 hour and 40 minutes $\pm$ 5 minutes.
- b. Since VCM II gallonage varies with VCM temperature, determine the VCM temperature on the charge line thermometer and determine the proper charge from Table C.

10. Reaction Control:

- a. During most of the reaction, the catalyst solution, emulsifier solution and VCM II are being added simultaneously to the kettle.
- b. Continue to control the reaction temperature at $50^{\circ}\text{C} \pm 1/2^{\circ}\text{C}$.
- c. The catalyst charge pump which was stopped at 100 BTU units before the start of the scheduled emulsifier is started again at the 36% low point on the reaction programmer cam when the reaction rate has fallen after the scheduled emulsifier charge has begun. This will normally be 50-100 BTU units after the start of the scheduled emulsifier.
- d. Control the catalyst addition rate as required to get the rate up to 83-86 charts units on the BTU meter chart.

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634.36 Batch Charging and Reaction Control (Cont'd)

10. Reaction Control: (Cont'd)

d.

NOTE: The batch will go into an early heatkick if the catalyst addition is resumed too early or too fast.

e. Control the catalyst rate to maintain the BTU schedule within the three lines on MS 3853.

f. The VCM II charge is completed about 2-1/2 hours after the beginning of the reaction.

11. Reflux Condenser By-Pass

Condenser By-Pass on No. 1, 2, & 3 Kettle

Instrumentation is provided for kettle pressure control during the latter portion of the batch cycle. This will be accomplished by instrument operation of the condenser inlet and by-pass valves. The purpose of this installation is to reproducibly by-pass the reflux condenser so as to prevent foaming and loss in heat removal capacity during the heat kick, especially on higher temperature polymerizations, e.g., Foamable Paste.

The instrumentation consists of two gauges, a selector switch and an auto-manual station.

One gauge will indicate kettle pressure and kettle pressure control set point. The control set point will be 125 psig. for Seed, Opalon 410, 440 and 400; for Foamable Paste, the set point will be 135 psig.

The set point must be changed by an instrument man before and after product changes to and from Foamable Paste.

The second gauge will indicate the amount of condenser by-pass. A reading of 10% or less indicates full cooling and a reading of 80% or more indicates a condition of full by-pass (condenser inlet valve closed and by-pass open).

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11. Reflux Condenser By-Pass (Cont'd)

The auto-manual station provides for operator control of the by-pass operation. With the auto-manual station in the manual position, the by-pass is carried out in exactly the same manner as it was previously done on No. 3 kettle, i.e., turning a knob on a pressure regulator to the inlet and by-pass valves.

The selector switch directly controls the by-pass operation. When the selector switch is in the "Normal" position, the condenser is on full cooling (condenser inlet valve open and by-pass closed). When the selector switch is switched to the "By-Pass" position, a pneumatic timing circuit will go into operation and will gradually limit the amount of water going to the condenser. The time for complete by-pass is adjustable from 15 minutes to over one hour.

Normal Operation of the Condenser By-Pass System

1. At the start of the water charge:
 - a. The auto-manual station was placed in the auto-matic position.
 - b. The condenser selector switch was placed in the "Normal" position.
2. As the reaction proceeds and the batch conversion reaches 70%, the reaction rate will increase rapidly, as noted on the BTU meter recorder, and the batch pressure will start to pulse and fall off. This usually occurs at approximately 7300-7500 BTU.
3. When the batch is definitely 4-6 psig below saturation pressure, open the condenser by-pass valves and close the condenser water valves for the condensers.

NOTE: By removing the condensers from heat transfer service during the unsaturated period, foaming will be minimized.

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634.36 11. Reflux Condenser By-Pass (cont'd)

3. The pneumatic timing circuit will go into operation. As the condenser is by-passed, the kettle pressure will start to rise. When the pressure rises to about 5-6 psig. below the set point, 125 lbs., the controller will come into operation. If the pressure continues to rise, the controller will override the timing circuit and not allow more by-passing to take place. Continued pressure rise will increase cooling. At 135 psig., a pressure switch will automatically stop the catalyst pump, if it has not been already stopped.
4. At a pressure of 140 psig., the valves will failsafe to full cooling position.
5. When the batch is transferred out of the kettle, return condenser selector switch to "Normal" position.
6. Once the by-pass operation has begun on automatic control, never attempt to complete it on manual control, because if the switch from auto to manual is not properly done, complete condenser plugging and loss of heat transfer will result.

NOTE: In the event kettle pressure cannot be controlled at 125 psig., at 145 psig. start venting as described in the heat kick control procedure.

12. Heatkick Control:

- a. Switch the batch TRC to manual and drop the jacket TRC set point to 0°C when the batch temperature reaches 53°C in the heatkick. Open the manual jacket dump valve.
- b. Stop the catalyst addition when the batch temperature reaches 56°C in the heat kick.

(At 6400 BTU I.U., reduce the emulsifier programmer cam to minimum position and charge at this rate until the start of the final emulsifier charge).

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634.36 Batch Charging and Reaction Control (Cont'd)

12. Heatkick Control: (Cont'd)

- c. Batch temperature will continue to rise, normally reaching a maximum of 58-62 °C. Open the jacket full cold water valve if the batch temperature reaches 63°C.
- d. If batch pressure reaches 125 psig, open one reflux condenser jacket inlet valve as required to control pressure at 125 ± 5 psig. As the pressure drops, close the valve --- as it rises, open the valve.

13. Final Emulsifier Charge:

- a. When the batch temperature drops 2°C below maximum temperature of heat kick, charge the emulsifier left in the tank at a maximum rate using final charge pump.
- b. Flush the pump and the line to the kettle with 20 gallons of hot (50°C) water.

14. Caustic Charge:

Immediately after the final emulsifier charge is completed, charge the caustic solution to the kettle.

15. End of Polymerization Procedure:

- a. After the caustic solution has been charged, drop the kettle agitator to low speed.
- b. Proceed with Section SDP 634.5 "Kettle Venting, Dumping and Flushing".

634.37 Standard Operating Conditions

The standard Opalon 440 batch must meet all of the following conditions. Batches not meeting these conditions indicate non-standard operating procedure, mechanical failure and/or a technical problem. Causes for non-standard batches should be defined and corrected as soon as possible.

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634.37 Standard Operating Conditions (Cont'd)

1. All raw materials must meet Monsanto specifications.
2. Seed particle size must be between 0.36 and 0.45.
3. Seed latex percent solids must be between 31.7 and 38.6%, with a latex stability of not less than 1 minute.
4. Vacuum purge must be between 20-24 inches Hg., at a batch temperature of $54 \pm 1^{\circ}\text{C}$.
5. Emulsifier charge must be within the limits indicated on the emulsifier schedule.
6. Reaction rate must be controlled within the limits indicated on the BTU schedule up to 6000 integrator units.
7. Catalyst consumption must be no more than 24 inches (107 gallons) of solution.
8. Batch temperature must be maintained at $49-54^{\circ}\text{C}$ from the start of the catalyst to 15 minutes after the start of the scheduled emulsifier.
9. Batch temperature must be maintained at $50 \pm 1^{\circ}\text{C}$ from 15 minutes after the start of the scheduled emulsifier to the start of the condenser by-pass.
10. Batch cycle time, from the start of the catalyst to the start of the final emulsifier addition must be from 210 to 260 minutes.
11. BTU total at the start of the final emulsifier must be from 6500-7500 integrator units.
12. A standard batch charge of 440 emulsifier will be added to each three-batch blend after concentration.

Ref: O. L. Marcheschi 2/19/69
R. S. Opalanko 4/1/69
O. L. Marcheschi 4/24/69

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TABLE A: SEED LATEX AND KETTLE WATER CHARGES

Opalon 440		13,650# Batch Size						
Seed Dia.	Raw Materials	Seed Concentration, % Solids						
		32.0	33.0	34.0	35.0	36.0	37.0	38.0
.32	Water, gal.	1792	1796	1799	1802	1805	1808	1811
	Water, in.	86-3/4	86-1/2	86-1/2	86-1/2	86-1/4	86-1/4	86
	Seed, lbs.	966	937	909	883	859	835	813
.33	Water, gal.	1785	1789	1792	1796	1799	1802	1805
	Water, in.	87	86-3/4	86-3/4	86-1/2	86-1/2	86-1/2	86-1/4
	Seed, lbs.	1059	1027	997	969	942	916	892
.34	Water, gal.	1777	1781	1785	1789	1792	1795	1799
	Water, in.	87-1/2	87-1/4	87	86-3/4	86-3/4	86-3/4	86-1/2
	Seed, lbs.	1158	1123	1090	1059	1030	1002	976
.35	Water, gal.	1769	1774	1779	1783	1786	1790	1793
	Water, in.	87-1/2	87-1/4	87-1/4	87	87	86-3/4	86-3/4
	Seed, lbs.	1244	1206	1171	1137	1106	1076	1047
.36	Water, gal.	1759	1764	1769	1773	1777	1781	1785
	Water, in.	87-3/4	87-3/4	87-1/2	87-1/2	87-1/4	87	87
	Seed, lbs.	1375	1134	1294	1257	1223	1189	1158
.37	Water, gal.	1750	1755	1760	1765	1769	1774	1778
	Water, in.	88-1/4	88	87-3/4	87-3/4	87-1/2	87-1/4	87-1/4
	Seed, lbs.	1493	1448	1405	1365	1327	1291	1257
.38	Water, gal.	1739	1745	1751	1756	1761	1766	1770
	Water, in.	88-1/2	88-1/4	88-1/4	88	87-3/4	87-3/4	87-1/2
	Seed, lbs.	1618	1568	1522	1479	1438	1399	1362
.39	Water, gal.	1729	1735	1741	1747	1752	1757	1762
	Water, in.	89	88-3/4	88-1/2	88-1/4	88	88	87-3/4
	Seed, lbs.	1748	1696	1646	1599	1554	1512	1472

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Monsanto Company

STANDARD PROCEDURE

Plant Springfield Number SDP 84-634.30B
 Department Opalon Paste Resin Sheets Page 17
 TITLE 440 POLYMERIZATION

TABLE A: SEED LATEX AND KETTLE WATER CHARGES (Cont'd.)

Seed Dia.	Raw Materials	Opalon 440 13,650# Batch Size						
		Seed Concentration, % Solids						
		32.0	33.0	34.0	35.0	36.0	37.0	38.0
.40	Water, gal.	1717	1724	1731	1737	1743	1748	1753
	Water, in.	89-1/4	89	88-3/4	88-1/2	88-1/2	88-1/4	88
	Seed, lbs.	1887	1829	1776	1725	1677	1632	1589
.41	Water, gal.	1706	1713	1720	1727	1757	1763	1769
	Water, in.	89-3/4	89-1/2	89-1/4	89	88-3/4	88-1/2	88-1/4
	Seed, lbs.	2032	1970	1912	1857	1806	1757	1711
.42	Water, gal.	1693	1701	1709	1716	1722	1729	1735
	Water, in.	90	89-3/4	89-1/2	89-1/4	89	89	88-3/4
	Seed, lbs.	2184	2118	2055	1997	1941	1889	1839
.43	Water, gal.	1680	1689	1697	1704	1711	1718	1725
	Water, in.	90-1/2	90-1/4	90	89-3/4	89-1/2	89-1/4	89
	Seed, lbs.	2343	2272	2206	2143	2083	2027	1973
.44	Water, gal.	1667	1676	1684	1692	1700	1707	1714
	Water, in.	91	90-3/4	90-1/2	90	89-3/4	89-1/2	89-1/4
	Seed, lbs.	2511	2435	2363	2296	2232	2172	2115
.45	Water, gal.	1652	1662	1671	1680	1688	1696	1703
	Water, in.	91-1/2	91-1/4	90-3/4	90-1/2	90-1/4	90	89-3/4
	Seed, lbs.	2686	2605	2528	2456	2388	2323	2262

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STANDARD PROCEDURE

Plant Springfield Number SDP 84-634.30 B
 Department Opalon Paste Resin Sheets Page 18
 TITLE 440 POLYMERIZATION

TABLE B: VCM I CHARGE

Seed Dia.	Opalon 440 13,650# Batch Size				
	VCM I Volume, Gallons vs. Monomer Temp., °F				
	<u>40-48°F</u>	<u>49-57°F</u>	<u>58-66°F</u>	<u>67-75°F</u>	<u>76-84°F</u>
.32	423	425	427	428	430
.33	419	421	423	424	426
.34	415	417	419	420	422
.35	411	413	415	416	418
.36	406	408	410	411	413
.37	401	403	405	406	408
.38	396	398	400	401	403
.39	390	392	394	395	397
.40	384	386	387	389	390
.41	378	380	381	383	384
.42	372	374	375	377	378
.43	365	367	368	370	371
.44	358	360	361	362	363
.45	351	353	354	356	357
.46	343	345	346	348	349

Basis: (1) Weight VCM I = 3538 lbs. - Weight of Seed

(2) Density VCM I = 8.167 - .00833T lbs./gal. T=°F

(3) Rotameter Correction Factor =

$$\left(\frac{7.92 - p \times .90}{7.02} \right)^{1/2} = \frac{\text{Volume True}}{\text{Volume Apparent}}$$

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BY *A. O. Ericksberg*

Monsanto Company

STANDARD PROCEDURE

Plant Springfield Number SDP 84-634.30B
Department Opalon Paste Resin Sheets Page 19
TITLE 440 POLYMERIZATION

TABLE C: VCM II CHARGE

<u>Opalon 440</u>	<u>14,150# Batch Size</u>
<u>VCM Temperature, °F</u>	<u>VCM II Volume, Gallons</u>
40-48	1390
49-57	1396
58-66	1402
67-75	1408
76-84	1415
85-93	1421

Basis: (1) Weight of VCM II = 10,612 pounds.

(2) Density VCM = 8.167 - .00833T pounds/gallon (T = °F)

(3) Rotameter Correction Factor =

$$\left(\frac{7.90 - p}{7.02} \times \frac{.90}{p} \right)^{1/2} = \frac{\text{Volume True}}{\text{Volume Apparent}}$$

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BY *A. A. Erickson*

RSV0028052

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STANDARD PROCEDURE

PlantSpringfield.....

Number SDE 84-634.3QB

DepartmentOpalon Paste Resin.....

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TITLE440 POLYMERIZATION.....

TABLE D: INITIAL EMULSIFIER CHARGE

Opalon 440

13,650# Batch Size

Seed Dia.	Weight of Duponal WAQM (or Sipex SM) Vs. Seed Batch Size									
	10,300- 10,500 lbs.		10,600- 10,800 lbs.		10,900- 11,100 lbs.		11,200- 11,400 lbs.		11,500- 11,700 lbs.	
	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.	lb.	oz.
.32	2'	1"	2'	2"	2'	3"	2'	4"	2'	5"
.33	2'	1"	2'	3"	2'	4"	2'	5"	2'	6"
.34	2'	2"	2'	3"	2'	4"	2'	6"	2'	7"
.35	2'	2"	2'	4"	2'	5"	2'	7"	2'	8"
.36	2'	3"	2'	4"	2'	6"	2'	7"	2'	9"
.37	2'	3"	2'	5"	2'	6"	2'	8"	2'	10"
.38	2'	3"	2'	5"	2'	6"	2'	8"	2'	10"
.39	2'	3"	2'	5"	2'	7"	2'	9"	2'	10"
.40	2'	3"	2'	5"	2'	7"	2'	9"	2'	11"
.41	2'	2"	2'	5"	2'	7"	2'	9"	2'	11"
.42	2'	2"	2'	4"	2'	6"	2'	9"	2'	11"
.43	2'	1"	2"	4"	2'	6"	2'	9"	2'	11"
.44	2'	0"	2'	3"	2'	6"	2'	9"	2'	11"
.45	1'	15"	2'	2"	2'	5"	2'	8"	2'	11"

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STANDARDS DEPARTMENT

Monsanto Company

STANDARD PROCEDURE

Plant Springfield Number SDP 84-634.30B
Department Opalon Paste Resin Sheets Page 21
TITLE 440 POLYMERIZATION

TABLE E: BTU READING AT START OF CONTINUOUS EMULSIFIER AND VCM II

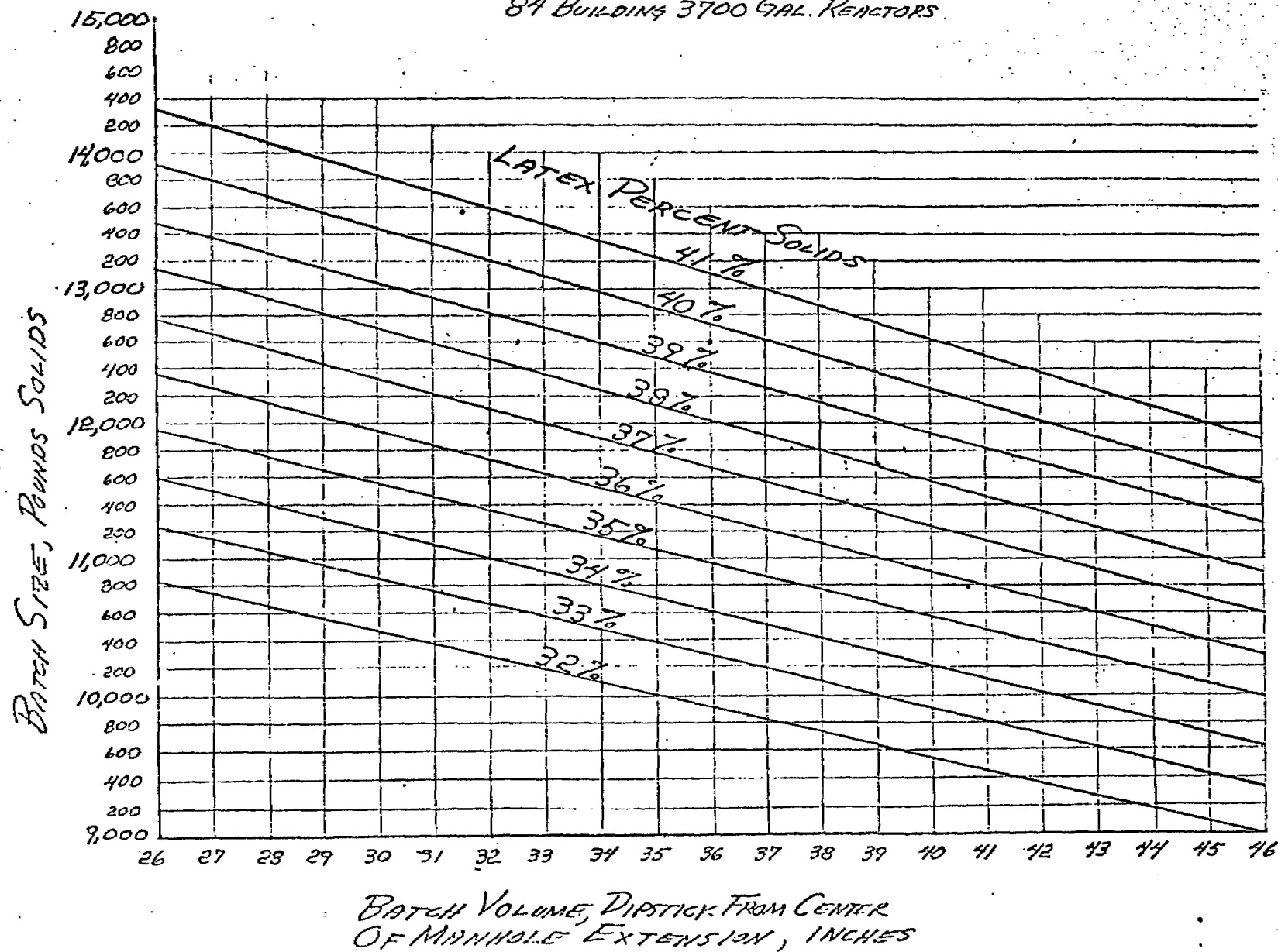
Opalon 440		13,650# Batch Size
BTU Meter Reading		
Seed Dia.	From: <u>Start of Catalyst</u>	<u>Start of Cont. Emul.*</u>
	To: <u>Start of Cont. Emul.</u>	<u>Start of VCM II</u>
.32	923	104
.33	902	100
.34	880	96
.35	855	92
.36	830	88
.37	801	83
.38	771	78
.39	740	73
.40	708	68
.41	675	63
.42	636	58
.43	599	53
.44	558	48
.45	505	43

*Reset BTU meter to zero at start of continuous emulsifier addition.

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BY *A.O. Erickson*

BATCH SIZE VS BATCH VOLUME
AND LATEX PERCENT SOLIDS
84 BUILDING 3700 GAL. REACTORS



RSV0028055

634.28 Hours 1

SDP 84-634.30 B

OPALON 440 OPERATING LOG

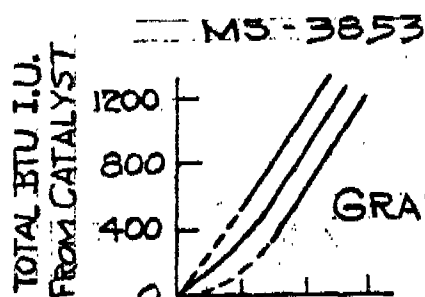
DATE: SHIFT: OPERATOR: BATCH:

KETTLE AND LINES FLUSHED ☐ VALVES CHECKED ☐ INSTRUMENTS SET ☐ SEAL PRESSURE 180-225 PSIG ☐

	LOT	AMOUNT	TIME		ELAPSED TIME
			START	END	
WATER	/	GAL	/	/	/
SEED	/	LB	/	/	/
INITIAL EMULSIFIER	/	LB OZ	/	/	/
VACUUM PURGE VACUUM OBTAINED: IN. Hg.	/	/	/	/	/
SALT (INITIAL AMMONIA: ML)	/	LB OZ	/	/	/
VCM-I TEMP. °F	/	GAL	/	/	/
TIME SOLUTION PREPARED: _____	/	/	/	/	/
CATALYST TANK LEVEL (INCHES) START _____ END _____	/	LB OZ	/	/	/
SCHEDULED EMULSIFIER NEOFAT 12	/	LB	/	/	/
STANDARD BTU	/	/	/	/	/
AT START: _____ AMMONIA TEMP. °F	/	GAL	/	/	/
ACTUAL BTU	/	/	/	/	/
START: _____ WATER TEMP. °F	/	/	/	/	/
VCM-II BTU AT START: _____ TEMP. °F	/	GAL	/	/	/
BY-PASS CONDENSER N _____ S _____ #3K _____	/	/	/	/	/
FINAL EMULSIFIER BTU: _____ TEMP. _____ PRESS _____	/	/	/	/	/
CAUSTIC-TIME SOLUTION PREPARED: _____	/	LB OZ	/	/	/
BATCH TRANSFERRED TO BDT	TRANSFER	/	/	/	/
	VENT	/	/	/	/
	*FLUSH	/	/	/	/
BATCH VENTED IN KETTLE	VENT	/	/	/	/
	DUMP DIPSTICK IN.	/	/	/	/
	SAMPLE TO LAB YES ☐ NO ☐	/	/	/	/
	*FLUSH	/	/	/	/

*FLUSH TIME EXTENDS UNTIL START OF WATER CHARGE FOR NEXT BATCH.

COMMENTS:



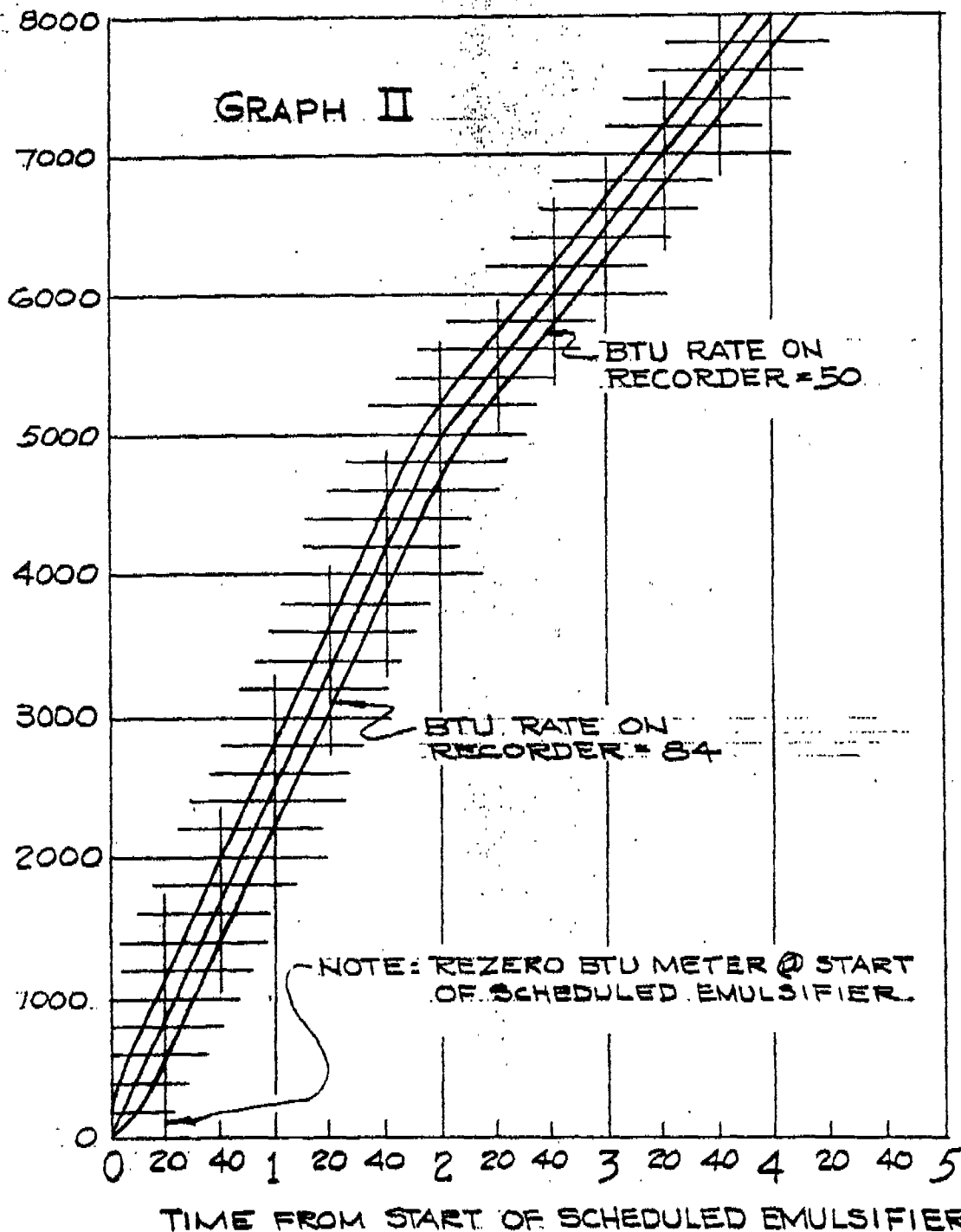
SDP 84-634.30 B

OPALON 440 BTU SCHEDULE

BATCH

GRAPH I

TOTAL BTU I.U. FROM START OF SCHEDULED EMULSIFIER



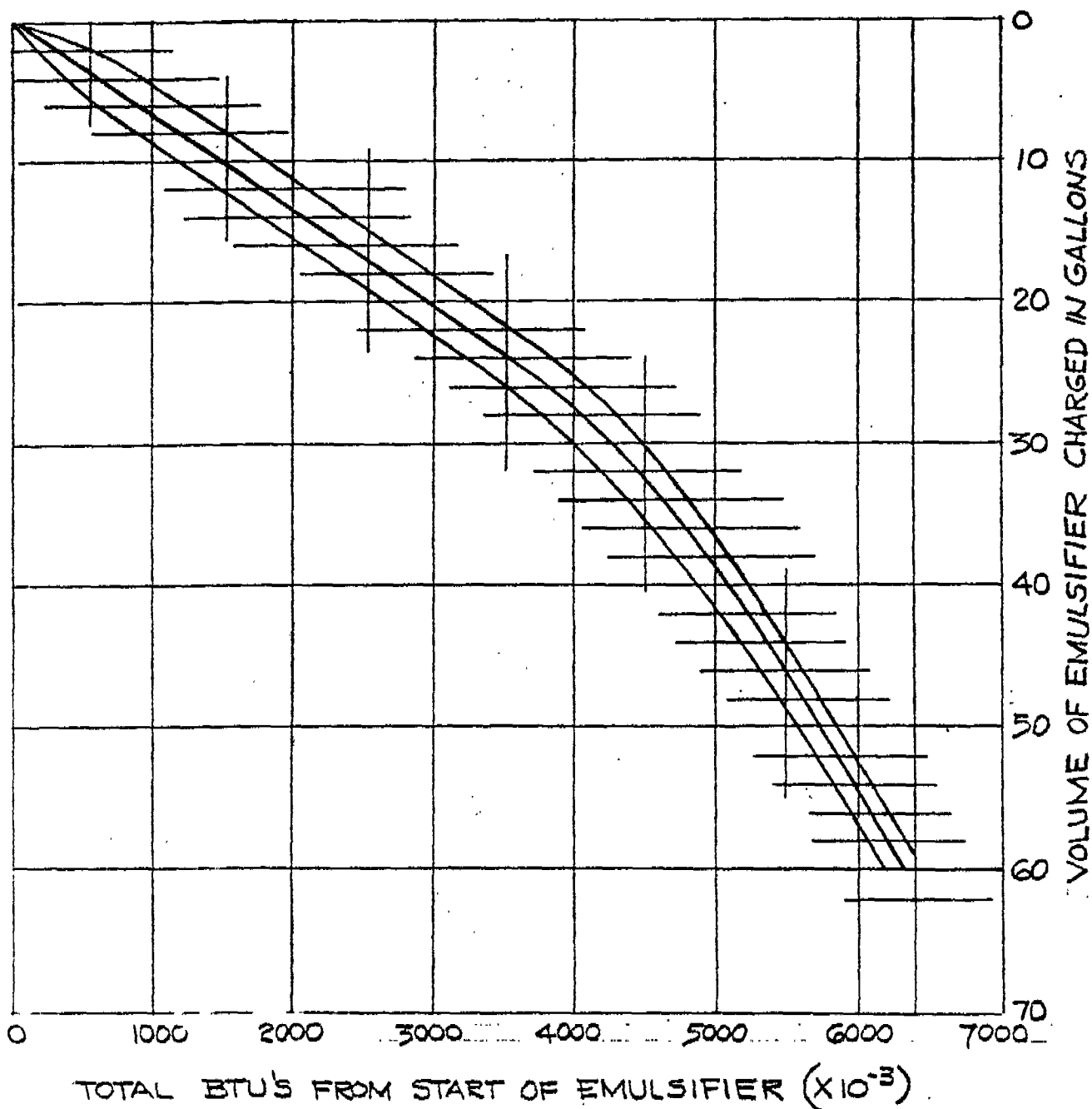
MS-3855

SDP 84-634.30B

EMULSIFIER CHARGE SCHEDULE

OPALON - 440

BATCH



RSV0028058

MS-3941

84 Bldg. - SHIFT SUMMARY

SDP 84-634.30B

Date	Shift	Batch	Lead Operator	Downtime Explanation
Batch				
Charge				
React				
F.E. Add				
Trans.				
Vent in K.				
Vent-Flush				
TAT				
Downtime				
EDT TAT				
Downtime				

Maintenance - Job Requested	Req. To	Time	Comp.

1 PT	2 PT	SEED	#1 K	#2 K
BA STATUS	BA STATUS	BA STATUS	BA STATUS	BA STATUS

BA	#1 CT	VCM TKS.
BA	#2 CT	#1
BA	#3 CT	#6
BA	#4 CT	

BDT

BATCH _____

STATUS _____

#2 PBT	#1 PBT
READY @	READY @

PRE-BLEND

BA

E-1 ADDED

YES NO

Batches Charged		
Batches Dumped	Seed?	Yes
Offgrade (as PVC)		
Batch	Lumps	Latex
E-1 made up?	Yes	No
Span made up?	Yes	No
Comments:		

RSV0028059

APPROVAL SHEET

TO: Date APPROVAL

No: SDP 84-634.30B

Date: March 3, 1969

[illegible]

Please check the attached procedure or specification and sign it if it meets with your approval. If you have any suggestions, corrections, or additions please note them on this sheet: DO NOT WRITE ON SPECIFICATION OR PROCEDURE.

Then detach one "RETURN TO STANDARDS DEPARTMENT" slip and return it under separate cover.

NOTE: If you are not comfortable with the attached steps, please do not sign the approval box to the right of your name and print along to the next page.

Please give this your immediate attention:

REMARKS: (Please initial)

- OK.
action (3-7-19) {
- ① Normal operation of Condenser by-pass. Both for 410 + 4410 Simulation the condenser will be switched to by-pass when a pressure drop occurs. -NA
 - ② No mention of catalyst pump Kick-off in standard procedure. -NA
 - ③ Pressure test procedure must be changed if catalyst pump Kick-off is retained. -NA
 - ④ Pressure test procedure will be revised to reflect use of catalyst pump in pressure test. This has already been found successfully. (Larry Marchewski. 3-2-69)

RSV0028060

DISTRIBUTION

SPRINGFIELD

OVERSEAS

MASTER ✓

10/1/69 R. Wojcik - 10/1/69

VAULT ✓

M. Kulik (6) ✓

J. Vihlen ✓

E. Hallen ✓

G. Toranzo ✓

R. Opalando ✓

L. Marchesi ✓

W. Gabel ✓

T. Boyd ✓

W. Zimmerman ✓

ADDITIONAL

DOMESTIC

Please remove and destroy pages 15 & 16 of your copy/copies
of SDP 84-634.30B issued 8/6/69 and replace with the attached
revised copy/copies.

A. O. Ericksberg
Standards Dept.

RSV0028062

APPROVAL SHEET

SDP 84-634.30B

Revised Page 15

TO:	Date	APPROVAL
A. Ericksberg	1/20	A. Ericksberg
R. Opalanko	1/20	R.S. Opalanko
W. Thomasino	1/21	W.T. Thomasino
J. Uihlein	1/21	J. Uihlein
C. Hallen	1/22	C. Hallen
W. Gabel	1/23	W. Gabel
T. Boyd	2/4	T. Boyd

No: _____
Date: January 20, 1970

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REMARKS: (Please initial)

DISTRIBUTION

SPRINGFIELD

OVERSEAS

MASTER

5/6/50 R.W. 5/6/70

VAULT

W. Thomasino (6)

J. Vihlein

E. Hallen

R. Opalando

G. Tonengann

L. Marcheschi

W. Gabel

T. Boyd

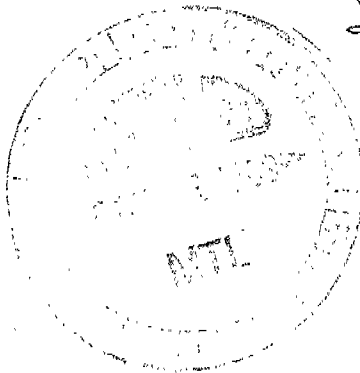
W. Zimmerman

ADDITIONAL

DOMESTIC

RSV0028064

To: M. O. Debacher
E. Lavin
R. B. Wojcik



Date 10/1/69

Attach d is:

☐ Research Tentative Process

☒ SDP - 84-634.30B

☐ FMS -

☐ RMS -

☐ CS -

☐ Std. Formula -

☐ Other: _____

☐ P -

☐ Final Report P -

☐ Q -

☐ Mfg. Rept. Q -

☐ Mkt. Rept. Q -

*Job #: _____ *Copy #: _____ Issue Date: _____

*Title: _____

Please indicate if there is to be any overseas distribution.

☐ No distribution

Distribute as follows:

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☐ AUSTRALIA	MC(A)L
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☐ CANADA	MOCAN
☐ ENGLAND	MCL
☐ FRANCE	MOFRAN
☐ ITALY	SICEDISON
☒ JAPAN	MM-K
☐ MEXICO	MEXICANA
☒ SPAIN	ETINO

Deletions:

☐ None

☐ As Follows:

OCT 16 1969

Wojcik
10/1/69

A. O. Ericksberg
A. O. Ericksberg
Standards Department

RSV0028065

To: M. O. Debacher
E. Lavin
R. B. Wojcik

Date 5/6/70

Attached is:

☐ R search Tentative Process

☒ SDP - *Revised pages 15+16*
to SDP 88-634.30B

☐ FMS -

☐ RMS -

☐ CS -

☐ Std. Formula -

☐ Other: _____

☐ P -

☐ Final Report P -

☐ Q -

☐ Mfg. Rept. Q -

☐ Mkt. Rept. Q -

*Job #: _____ *Copy #: _____ Issue Date: _____

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☐ FRANCE	MOFRAN
☐ ITALY	SICEDISON
☒ JAPAN	MM-K
☐ MEXICO	MEXICANA
☒ SPAIN	ETINO

Deletions:

☐ None

☐ As Follows:

MAY 13 1970

A. O. Ericksberg
A. O. Ericksberg
Standards Department

RSV0028066