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pg 4 & 5 very good R+D info.

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TRIP REPORT

General Electric
Rome,
Georgia

Date of Call: June 23, 1969

Person Contacted: For General Electric

For Monsanto

John Dutton - Mgr. Adv. Design Engr.	D. Hamil
Bob Ristow - Unit Subst. Design Engr	D. Pogue
James Kinney - Adv. Dev. Engr.	
Frank McCann - Prod. Planning, Ind. Mkt.	
Ken Cox - Mgr., Prod. Planning	
Larry Crowe - PA	

Purpose of Call: Transformer Dielectric Study

Transformer Production:

Rome is General Electric's medium transformer department. They produce liquid filled, unit substation transformers in the 112 1/2 - 2500 KVA, 15 KV and less range. Secondary voltages are normally 208-600V, with a few up to 5KV.

Askarel represents 30% of total liquid units, and less than half of their total production. They also produce open dry, sealed dry and oil unit substations and HV padmounts, normally oil filled. Rome estimates they have 40 - 41% of the unit substation market, with the remainder shared by Westinghouse, Sharon/ So. Boston and 2 - 3 others.

Rome's unit substation end-customers are the industrial and commercial market. The utility market represents only 3 -4% of their production. Conversely the Pittsfield plant produces all utility substation units. Apparently Pittsfield's production can be expected to be 50% power transformers and 50% distribution (including unit substations).

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We can expect about the same or slightly less in aroclor demand from Rome this year. Their forecasted transformer production schedule is as follows:

UNIT SUBSTATION SALES - G.E., ROME, GEORGIA
(Number of Transformers)

	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>
Liquid ¹	1944	1851	2115	2435	2680	2968	3508
Open Dry	----2	489	653	658	667	736	872
Sealed Dry	----2	93	98	98	97	107	127
Total	1944	2433	2871	3191	3444	3811	4507

1. 80% askarel; 20% oil filled
2. Information not obtained

Sord!
The above decrease in the number of units; should be offset by GE's immediate plans to increase askarels usage by 25-30% per transformer. They are switching from copper windings to aluminum which will, because of higher resistivity demand increased coil and tank sizes.

The sealed dry type production represents annual sales of Freon C-318 (C4F8-cyclic) gas filled substation units to General Motors. According to Bob Ristow General Motors is predominately dry type.

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Profitability

General Electric - they make more profit on askarel units than Fluor. Fluor's attitude is complacent towards GE's units. To get the sale they don't care which type is specified.

Production - Cycles; Purchase Lag

They were interested to find that their five year history of monthly purchases correlated closely with the total industry. Normal purchases patterns are heavy during the first and fourth quarters with a June - July slowdown. Rome represented 14-15% of our sales in 1964, 17-19% in 1965-1968. Currently they are running 13%.

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Variety of reasons were voluntarily discussed as possible sources for their very slow performance this year, until this month. The consensus was not Westinghouse price cutting, nor a serious decline in transformer sales, but that 1968 inventories were not depleted due to their one day per month production strike during 1968. This created a large backlog of oil filled power transformers that received priority in production through 1969 YTD. They're now scrambling to meet Pyranol commitments.

Industries winter sales peaks were explained as due to utility and industry capital expenditure budgets being approved late in the year. Orders are then placed early in the new year with actual transformer shipments not in the late year when construction is completed.

Normally GE has a 10-12 week production lag for askarel units. This represents the time required to build the unit once the production orders received.

Marketing:

General Electric markets Pyranol transformers through multi line district salesmen, who also handle all types of switchgear, motors and related electrical equipment. Each salesman is a market specialist, i.e. industrial, commercial, utility, etc. They are not profit oriented marketers thus salesmen do not give preference to askarel transformers. McCann did agree to my meeting with a St. Louis district representative to learn more about GE's marketing organization. I am to advise him first, and I agreed not to discuss profitability. }

Rome also serves the international market. These sales are directed by a team at Rome. Foreign agents solicit the business abroad.

Market Demand

They see an increase in askarel unit substation demand, as evidenced by their rising production forecasts. However, they report:

1. The 95 BIL dry type transformer will be detrimental to Pyranol sales (undetermined magnitude). The 95 BIL offers similar economy and greater resistance to impulse surges and customers are requesting them. McCann feels the greatest detriment to Pyranol will occur in the commercial market, high rise office buildings, etc.

The 95 BIL unit was first commercialized 3-3 1/2 years ago and now is being manufactured by 3-4 companies, including Federal Pacific Electric and Standard Transformer Co.

2. The Utilities are requesting fewer askarel units. Primary reason is louder voices on the subject "they explode so why pay extra." McCann cited Consolidated Edison's announcement at a technical association meeting that askarel is not part of their future transformer plans, due to past failures. GE feels many smaller utilities follow the leadership of the giants like Con. Ed. Also transformer specifiers traditionally are experienced personnel with long memories for the occasional askarel explosions in industry.
3. Our primary untapped, and available market are architects and engineers, who represent the largest dry type market. Unlike utilities the A & E's continue to specify dry type even though higher losses are experienced with dry units. Reason--commercial customers do not monitor losses; utilities do monitor losses.

projects market demand based on guidance from general economic (construction and KV generating capacity) and in detail from industry shipments via NEMA. They weren't aware that NEMA data appears inconsistent due to member companies not reporting in years.

Market Attitude - Needs

Attention P. Benignus: Rome's foremost concern is arc formed gases. Hanney stressed a meeting with Paul and Munch as soon as possible. They want to review results of our studies re. explosive characteristics of various TCB blends. Another concern is to quickly resolve whether or not to redefine askarel in view of the arc formed gas problem. They are relying on the results of Monsanto tests and current tests at Pittsfield before moving ahead on redefinition. Their criteria for a transformer blend only meeting NEMA standards (-20°F) and filterable at room temperature.

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Reportedly Moloney Electric's transformer explosion mushroomed the controversy on askarel arc formed gases. Moloney's experience was related at IEEE and made public minutes. In general they expressed real concern that utility attitudes were increasingly negative towards askarel. Cited was the Port Authority, N. Y., Baltimore Gas & Electric, and Consolidated Edison. Rome's market, the A & E's, tend to follow the attitudes of large utilities.

Industry trends are to higher voltage requirements, 22.9 and 34.5 KV. Normal askarel limit is 40 KV, however, the insulation class level is lost above 15 KV.

Rome suggests more research for dielectric fluid blends with higher impulse strengths and new economical insulations to gain 80° rise temperatures, without severe core and load losses. Dry types can withstand 80° - 150°F rise over 30° ambient, but with high losses. However they are economic enough to use near generating stations where losses are cheap.

A major manufacturing problem seems to exist with incorrect materials of construction, which in turn could cause askarel transformers failures through moisture leaks. Rome thinks this is a major cause of failure. They are looking for askarel resistant gasket and wiring materials, and economical paints. Their ultimate need is a universally compatible system for both oil and askarel, or a fool proof way to use incompatible oil and askarel materials without occasional errors that result in field problems.

GE supported continued advertising (with changes as suggested) to reach consultants and A & E's. They didn't feel our marketing capabilities would be of value in reaching the utility specifiers.

Askarel Usage Per KVA

The following data was provided on askarel consumption per KVA unit substation transformer (copper coils), at 15 KV rating.

<u>KVA Rating</u>	<u>lb. Askarel/KVA</u>
500	2.5
750	2.07
1000	1.8 (Average)
1500	1.56
2000	1.37
3500	1.22

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The above usage rates would increase with higher voltage ratings and with the use of aluminum coils.


D. R. Pogue

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