

GAK

Milwaukee, Wisconsin
April 13, 1972
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Mr. F. G. McGinn: (2)

You requested comments regarding the presentation made by the General Electric Company on March 20, 1972, concerning a proposal for the closing of the gap in the electrification system between Avery and Othello, and the supplying of new electric locomotives.

The detail regarding locomotives is, of course, of major interest to my department, and I wish to comment as follows:

A. New Locomotives

The quantity of new locomotives of diesel type as well as electrical type stated in the G.E. 3-20-72 proposal, appears to be excessive. We presently estimate that 63 diesel units of SD-40 six axle 3,000 H.P. rating can handle the main line proposed operation Harlowton to Tacoma versus the 90 diesel units stated in paragraph 18 of the G.E. 3-20-72 proposal. If new SD-40 locomotives are provided and weight on drivers of 25,400,900 lbs. per paragraph 18 of G.E. 3-20-72 proposal is provided 71 SD-40 units would be required. However, we have learned from Mr. Frazier that on the specific day when required weight on drivers of 25,400,900 lbs. was developed by G.E. there were very exceptional train delays and this should not be considered a criteria for determination of units required. As discussed, I assume you will have Messrs. Anderson, Burke and the Power Bureau arrive at a proper quantity of new units. We note that G.E. in paragraph 7 places significance on anticipated higher availability of electrics versus diesels. It is our opinion that the flexibility of the diesel to run freely on the main line of our entire railroad and also interchange with diesel power on the various branch lines (particularly in the Seattle-Tacoma area) affords for the diesel a utilization advantage which is not reflected in the G.E. 3-20-72 proposal.

The fact that a fully dieselized service will permit operation through Harlowton without a changeout of power is not reflected in the G.E. 3-20-72 proposal.

B. Locomotive Repair Costs

As previously stated in other studies on the basis of facts we have developed from operation of our EF-4 (Joe) units, we do not anticipate the sharply reduced locomotive repair cost for electric locomotives claimed in the General Electric Company study. We note per paragraph 10 of the G.E. 3-20-72 proposal that the basis for repair cost comparison is apparently some data developed in Europe and South Africa where substantial sized electrified operations are handled. Our proposed 3,000 volt D.C. Electrification will be a relatively small operation and we do not anticipate any of the substantial cost reduction benefits for new motive power or in maintenance of motive power which a large scale electrification should generate. While the G.E. 3-20-72 proposal does not describe a specific electric unit, on the basis of what information is given, the cost of the electric units will apparently

approximately \$138 per rail horsepower. Whereas, modern GP-40 diesel units are estimated to be available for \$113 per rail horsepower and SD-40 diesel units are estimated to be available in 1973 for \$129 per rail horsepower. Thus, while the electric locomotive is considered to be simpler than a diesel locomotive due to no internal combustion engine on an electric locomotive, the price on a rail horsepower basis continues to exceed that of a diesel locomotive. This we attribute to the fact that diesel locomotives are a mass production item. Further, development and research work is continually underway for the large market served by the diesel locomotive whereas the electrification field in this country does not have the benefit of this continuous development pressure. The mass production characteristic of the diesel locomotive has placed the production and reworking of replacement parts on a competitive basis, which assists in controlling maintenance costs. The electric locomotive does not have this advantage. We anticipate that these "custom built" characteristics of the proposed new electric units will "spill over" into our maintenance costs just as has been the case with our "Joe" units. We will probably be the only railroad in the United States who will use the 3,000 volt D.C. units to be designed and built exclusively for us. If large quantities of 3,000 volt D.C. locomotives were used in the United States, more significant first costs and repair cost advantages of electric locomotives would probably become a reality. It is our opinion that we will not see large scale 3,000 volt D.C. electrification in the United States in the future.

Further, in reviewing the matter of locomotive maintenance we note that the G.E. 3-20-72 proposal calls for full replacement of all diesel units after 15 years of service, whereas electric units will operate 30 years. The diesel operation is burdened with this cost of motive power replacement. We have in our experience and records found that new locomotive units of either type do operate during the initial years following acquisition at a very low repair cost. In an effort to investigate this aspect of the proposed operations we have developed Graphs I, II, and III attached which illustrate the "Joe" units versus F-7 diesel units and then GP-40 units assumed to replace the F-7 units after 15 years of service. These graphs simulate an electric locomotive operating 30 years versus two groups of diesels each running 15 years. The data plotted in Graph I is our actual cost per unit mile data through Year 1971. The data after 1971 is our estimate of costs with the G.E. five per cent inflation rate applied to the costs after 1972.

Summary of averages for 30 years of data stated on Charts I, II, and III is as follows:

	Chart I Cost Per Unit Mile	Chart II Cost Per 1000 Rail H.P. Miles	Chart III Cost Per Locomotive Ton Mile on Drivers
EF-4 "Joe" Electric	56.4¢	11.0¢	25.5¢
F-7 & GP-40 Diesel	26.2¢	12.0¢	19.7¢

On the basis of averages stated on Charts II and III we do not anticipate a significant reduction in locomotive repair costs with the electric units. We do agree that this is difficult to state with absolute

positiveness as we do not have the details of the proposed G.E. electric locomotive design. We cannot visualize how the factors described above can be overcome and the G.E. anticipated electric locomotive repair cost of only 32.2% of diesel repair cost can be attained. (G.E. 3-20-72 proposal states 11.2¢ per MGTM for electric units and 34.8¢ per MGTM for diesel units which yields anticipated electric locomotive repairs of 32.2% of anticipated diesel locomotive repairs).

Further, since reference is made to European Railway repair cost data, we have reviewed a paper recently presented by former Chief Engineer Nouvion of the French Railways and note he states ratios of electric to diesel locomotive repairs ranging from 55.5% to 32.3% and we feel these are figures generated by a large scale electric locomotive operation. Nouvion also states the diesel oil engine and its accessories accounts for 41.0% of a diesel electric locomotive repair cost. If this internal combustion engine repair expense is eliminated from an electric locomotive, an electric to diesel locomotive repair ratio of 59% results.

It is readily apparent that it is difficult to positively state electric locomotive repair cost versus diesel locomotive repair cost and we have discussed this at length this week with Mr. Frazier and Mr. Wylie. Mr. Frazier and I suggest that one computer run be made with an electric to diesel repair cost ratio of 60% and one with 50%.

In any case, the locomotive costs for the first few years of operation with 23 year old "Joe" units operating at the costs shown in Charts I, II, and III, versus all new diesel units, does in our opinion justify an alteration in locomotive repair costs estimated for the first few years.

Reviewing the cost tabulations in the G.E. 3-20-72 proposal for years 1974 through 2003 emphasizes the importance of the anticipated locomotive repair savings and justifies a most intensive review of locomotive repair cost reduction anticipated by General Electric.

C. General Comment

We understand EMD will market ASEA electric locomotives in the United States, and suggest an electric locomotive quotation be requested from EMD.

The G.E. 3-20-72 proposal considers only complete immediate dieselization versus complete immediate 3,000 volt D.C. electrification Harlowton to Tacoma. The alternate of continued operation of the Rocky Mountain Division, electrified until "Joe" units wear out and then dieselization, should also be considered, in my opinion.

The recovery we could make from sale of copper and power lines if we dieselized is apparently not reflected properly in the G.E. comparison, of electrification versus dieselization.

If our major reason for electrification is to protect ourselves against possible shortage of fuel oil, and pollution complaints, I suggest we consider electrifying our Chicago to Minneapolis line, where

we have a much heavier concentration of population, as well as freight and passenger traffic. An investment in this location would have much heavier utilization and could be made 60 Cycle, 50 KV, which appears to be worthy of expansion to other lines on our railroad, as well as other railroads. This would give us locomotives of a type considered modern in Europe, and being considered by other United States rail lines.

Please let me know if any additional information is required.

In closing, I wish to state, we are looking forward to handling an electrified operation, if it is concluded to be desirable, as we do wish to see a decision made regarding electrification.

S. A. Kellow

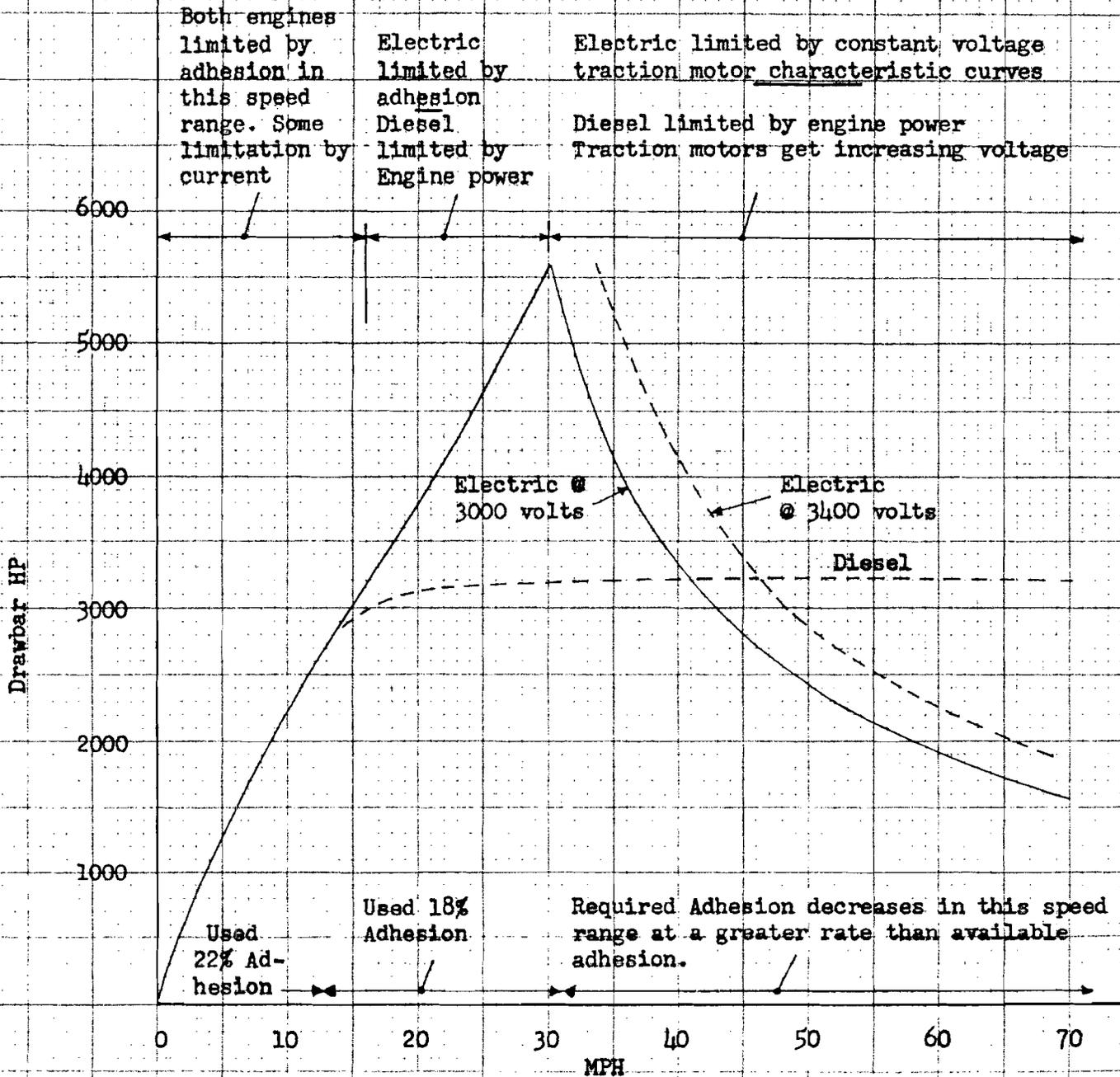
cc: G. A. Kellow ✓
L. V. Anderson
G. R. Frazier

COMPARISON OF DRAWBAR HORSEPOWER
VS. SPEED FOR DIESEL & ELECTRIC
ENGINES

Both units 390,000 lbs. on drivers

Electric: 6 750 GE Traction Motors

Diesel : SD-45 3600 HP Nameplate



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