California Department of Transportation
Environmental Program
Office of Environmental Engineering
Sacramento, California

Use of California Vehicle Noise Reference Energy Mean Emission Levels (Calveno REMELS) in STAMINA2.0 FHWA Highway Traffic Noise Prediction Program

Technical Advisory, Noise

TAN 95-03

September 22, 1995

Prepared by Rudy Hendriks

Use of California Vehicle Noise Reference Energy Mean Emission Levels (Calveno REMELS) in STAMINA2.0 FHWA Highway Traffic Noise Prediction Program

Since 1985, with approval of FHWA, Calveno REMELS have been used in lieu of the National REMELS for all Caltrans noise studies, and those done by others in California. The speed-dependent curves of the Calveno REMELS, and their equations for the three vehicle types defined in the FHWA-RD-77-108 report, are shown on the attached page titled: "*California Vehicle Noise (Calveno) Emission Levels".* Page 5 of the above FHWA report (showing the National REMELS) should be substituted with the Calveno page when noise predictions based on FHWA-RD-77-108 are made in California.

Several computer programs are available for highway traffic noise predictions. All are based on the above FHWA report. The programs are:

- "LeqV2", for simple site geometries
- "Sound32", for complex site geometries, involving many roadways, receivers, and barriers
- "STAMINA2.0/OPTIMA"

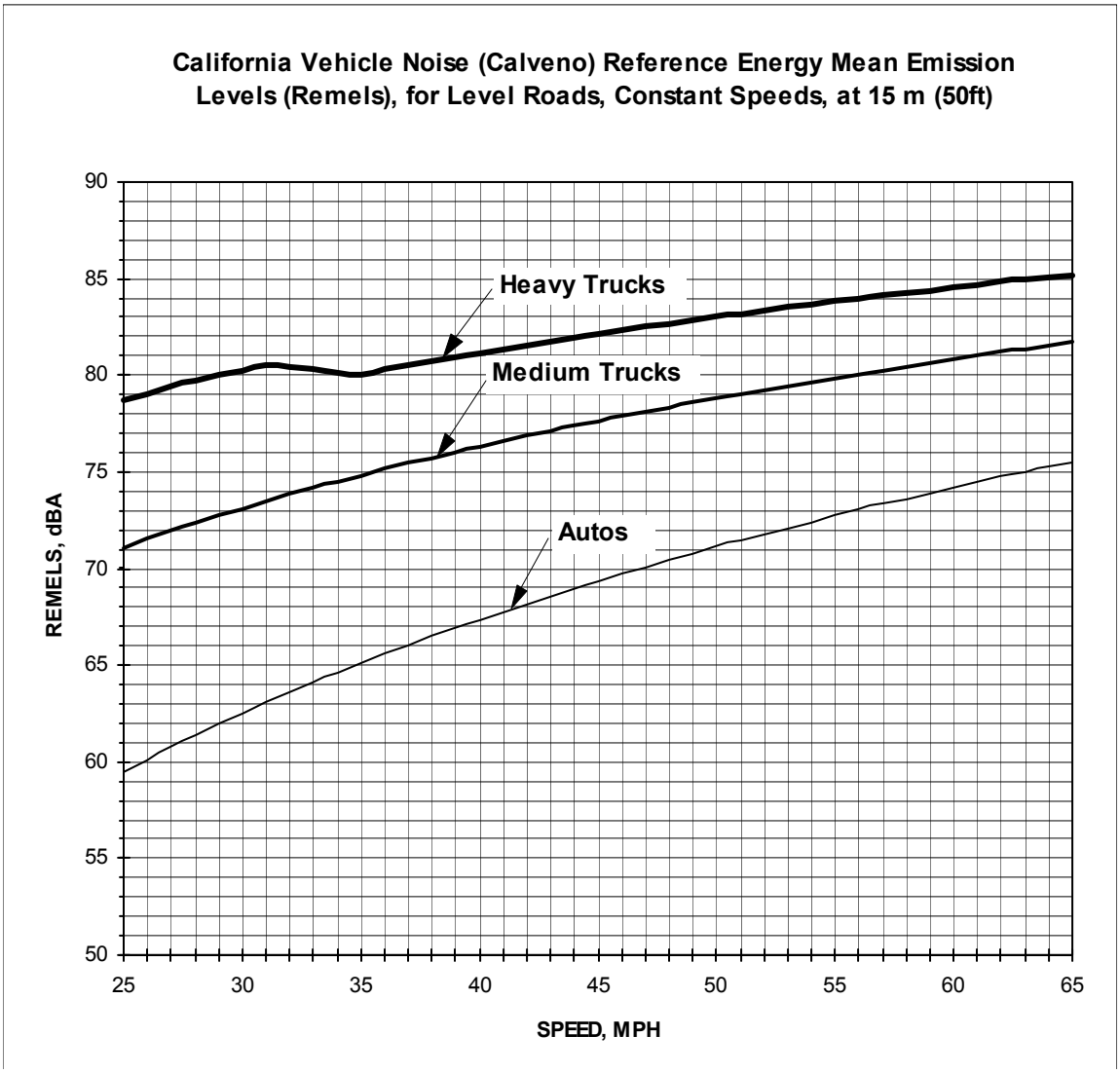
The first two programs allow the choice of Calveno or national REMELS. "Sound32" is the California version of the FHWA STAMINA2.0/OPTIMA programs. STAMINA2.0 uses only the National REMELS and is therefore not suitable for use in California. STAMINA2.0 does provide user defined vehicle type fields, which allow the user to type in their own REMELS (such as Calveno). However, we have discovered that that there are errors in the STAMINA2.0 code which cause the program to sometimes skip the barrier attenuation calculations for low barriers for user defined vehicle types. Many noise consultants doing work for Caltrans use STAMINA2.0. For those who use STAMINA2.0 we recommend that the vehicle types built into the program (National REMELS) be used, and the traffic volumes be adjusted to yield the same results as those produced with Calveno. The following table shows the volume "correction" factors necessary to use STAMINA2.0 in California. The actual volumes should be multiplied by these factors, then used in STAMINA2.0, to produce the same results as "Sound32" or "LeqV2" with Calveno.

Traffic Volume Correction Factors (For use with National REMELS, to yield same predicted noise as with Calveno REMELS)

		Multiply Actual Volume By:		
SPEED (MPH)	SPEED (Km/h)	AUTOS (A)	MED. TRUCKS (MT)	HEAVY TRUCKS (HT)
30	48	1.19	0.92	1.08
35	56	1.21	0.81	0.71
40	64	1.22	0.73	0.66
45	72	1.23	0.66	0.62
50	80	1.24	0.60	0.58
55	88	1.24	0.56	0.55
60	97	1.25	0.52	0.53

For example: If actual traffic volumes and speeds are: A=1500 @ 60 mph; MT=125 @ 55 mph; HT=250 @ 55 mph, use National REMELS with A=1875 @ 60 mph; MT=70 @ 55 mph; HT=138 @ 55 mph to get same results as actual traffic with Calveno REMELS.

California Vehicle Noise Reference Energy Mean Emission Levels



REGRESSION EQUATIONS

Heavy Trucks:

25-31 mph (40-50 km/h): $51.9+19.2\text{Log}_{10}(\text{Speed, mph})$ or $47.9+19.2\text{Log}_{10}(\text{Speed, km/h})$

35-65 mph: (56-105 km/h): $50.4+19.2\text{Log}_{10}(\text{Speed, mph})$ or $46.4+19.2\text{Log}_{10}(\text{Speed, km/h})$

31-35 mph: (50-56 km/h): Straight line

Medium Trucks:: $35.3+25.6\text{Log}_{10}(\text{Speed, mph})$ or $30.0+25.6\text{Log}_{10}(\text{Speed, km/h})$

Autos: $5.2+38.8\text{Log}_{10}(\text{Speed, mph})$ or $-2.8+38.8\text{Log}_{10}(\text{Speed, km/h})$