n-96-01 #6 II-A-1106 EPA HEALTH AND WELFARE AWALYSES NOISE EMISSIONS STANDAROS ONAC 81-02



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY WASHINGTON A D - 20460

> OFFICE OF AIR, HOISE, AND PADIATION

December 4, 1980

MEMORANDUM

SUBJECT: International Harvester: Petition for Reconsideration 1982 Medium and Heavy Truck Noise Emission Regulation

FROM: Jeffrey Goldstein, Bioacoustical Scientist Scientific Assistant's Staff

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Gerry Smith, Standards and Regulations Division

THRU: R.M. R.P. zzo, Scientific Assistant to he Deputy Assistant Administrator, ONAC

This memorandum is in response to your note, dated December 2, 1980, requesting comments on the validity of arguments submitted by International Harvester (IH) as a basis for their petition for reconsideration of the 1982 Medium and Heavy Truck Noise Emission Regulation. From the brief description of the Battelle Traffic Noise Exposure Model as furnished in Appendix A of the petition, it is evident that the EPA roadway traffic noise prediction computer model and the Battelle model are sufficiently similar to one another in structure and concept as not to constitute a basis of contention to the EPA regulatory analysis. Nevertheless, based upon my examination of the petition, it is clear that the interpretations of the analytical results derived from the Battelle model, as offered by IH, are quite narrow, bear little resemblance to real-world impact conditions, and appear to be unduly biased in the direction of showing minimal benefits per unit cost. My specific comments to the arguments presented within the petition follow:

1. On page 3 of the petition, IH states that from their analysis they find "...that in excess of 9 million people will be impacted by the 80 dB(A) Standard at Ldn levels equal to or greater than 55 dB(A)." Upon examination of Exhibit III to the petition, it is evident that the IH cited figure of 9 million people benefiting from the truck regulation represents only the numerical difference between the number of people living in areas exposed to Ldn of 55 dB or greater with an 83 dB regulation in effect (i.e., 104 million people), and the number of people similarly exposed after promulgation of a more stringent 80 dB regulation (i.e., 95 million people). In other words, the only regulatory benefit recognized by IH is the number of people who would be fully removed from long-term exposure to average noise levels exceeding a value of Ldn = 55 dB (a level identified by EPA below which the American public would be at no risk) after a more stringent limit were imposed. Conversely, it appears that IH does not wish to acknowledge the other 95 million Americans who, although not fully removed from impact, would subsequently experience a quieter, more livable environment. Although removal from risk is one measure of health and welfare benefit, to focus only on this factor represents an extremely parochial view of the benefits that would be gained from the more stringent regulation. As point in fact, again using the analytical results furnished by IH, 104 million Americans are projected to remain exposed at levels above those identified as requisite to protect health and welfare after promulgation of an 83 dB truck noise regulation. Therefore, by imposing an even more stringent noise emission standard, all 104 million people would logically benefit from lessened noise, representing almost one half of the U.S. population, not a mere 4 percent as presumed by IH.

2. The IH analysis, as admittedly did the earlier EPA analysis, fails to recognize that anticipated growth in U.S. population and associated increases in traffic volume will result in many more people impacted by traffic noise than the 104 million people referred to above. EPA estimates that even with an 83 dB regulation in effect, over 136 million people would reside in areas exceeding the identified minimal risk threshold of Ldn = 55 dB, and, accord-ingly, all 136 million would derive benefits from the issuance of more stringent noise emission limits.

The interpretation of the analytical results as offered by IH assumes 3. that no health and welfare benefits would accrue by lessening truck noise emissions to a level even lower than 80 dB. This assumption erroneously fosters the image that the marginal benefits yielded between the current 83 dB standard and the future 80 dB regulatory limit is beyond a point where meaning-ful health and welfare benefits can be gained. Ostensibly, IH argues that it makes little sense to go to an 80 dB regulation since most of the benefits would have been captured at the 83 dB level. However, this argument misrepresents the magnitude of benefits that can be fully realized. For example, as shown in the EPA regulatory analysis assuming full replacement of the truck fleet and no increases in either traffic volume or U.S. population growth, an 83 dB regulation would, in the year 2001, yield a 21 percent reduction in the extent and severity of national traffic noise impact, while an 80 dB limit would provide a 27 percent benefit. However, an even more stringent limit of, say, 75 dB would yield benefits on the order of 35 percent! Clearly, the benefits derived continue to be quite substantial at regulatory levels even more stringent than the proposed 1982 limit. The 80 dB regulatory level is a significant step toward achieving even greater noise relief.

4. On page 3 of the petition, IH states that a daily average benefit of 0.6 dB is imperceptible. This statement unfortunately reflects some serious misconceptions that prejudice the importance of noise relief for millions of Americans exposed to excessive traffic noise. In making this statement, IH is confusing the concept of noise level with that of noise exposure. While differences on the order of 0.6 dB between two successive transient events may be imperceptible, such small differences in community noise exposure over extended periods of time are meaningful and quite predictable. The benefits derived from small reductions in noise exposure over the long term are quantifiable in a statistical manner in terms of aggregate community response.

5. Also on page 3 of the petition, IH states that they believe their estimates of benefits are ultraconservative since EPA's identified level of 55 dB to protect public health and welfare includes a built-in margin of 5 to 7 dB below "...a level of 'significant complaint' community reaction." It should be noted that the identified level was reached through consensus among nationally and internationally recognized experts as a level below which the U.S. population would be subjected to only minimal risk from noise exposure. Moreover, in view of recently available community attitudinal data, it appears that there exists a firm basis to further reduce the identified threshold value to below 55 dB, i.e., if anything, the 55 dB threshold may be too high. The identified protective community noise level is not based on the significance of overt complaints (which are greatly influenced by a host of socioeconomic factors), but is concerned with the totality of the noise pollution problem which is, for the most part, not duly reflected in complaint behavior.

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RESPONSE TO INTERNATIONAL HARVESTER (IH) PETITION ON THE BENEFITS ANALYSIS FOR THE MEDIUM AND HEAVY TRUCK NOISE EMISSION REGULATION

(Summary of December 4, 1980 memorandum from J. Goldstein to G. Smith)

The IH petition relies heavily on results from the roadway traffic noise prediction model developed by Battelle Laboratories. Because the Battelle model is quite similar to the EPA roadway traffic noise prediction model, the results from the two models are essentially the same. However, the interpretations are substantially different. The IH interpretations bear little resemblance to real-world impact conditions, and are unduly biased in the direction of showing minimal benefits. Specific observations on the IH interpretations are:

1. IH greatly underestimates the number of Americans who would benefit from an 80 dB truck regulation--9 million (difference between the 104 million people living in areas exposed to an Ldn of 55 dB or greater with an 83 dB regulation minus the 95 million people exposed to an 80 dB regulation). IH does not acknowledge the other 95 million Americans who, although not fully removed from impact, would benefit from a quieter, more livable environment. Therefore, almost half of the U.S. population would benefit from the 80 dB regulation, not a mere 4 percent as stated by IH.

2. The IH analysis fails to recognize that anticipated growth in the U.S. population and associated increases in traffic volume will result in many more Americans impacted by traffic noise than 104 million people. Considering population and traffic growth, EPA estimates that 136 million Americans would benefit from the 80 dB truck regulation.

3. IH argues that it makes little sense to go to an 80 dB truck regulation since most of the benefits would be gained with an 83 dB level. This argument erroneously assumes that no benefits would be gained below an 80 dB level. EPA projects that in the year 2001, an 83 dB regulation would reduce the impact about 21 percent, while an 80 dB regulation would provide a benefit of 27 percent. A more stringent limit of, say, 75 dB would yield benefits about 35 percent. The benefits therefore, of going from an 83 dB to an 80 dB regulation are not, as IH asserts, the maximum that can be achieved.

4. IH states that a benefit of 0.6 dB reduction in average daily noise level cannot be perceived. IH is confusing the concept of noise level with that of noise exposure. While noise <u>level</u> differences on the order of 0.6 dB between two successive truck pass-bys may be imperceptible, such small differences in community noise <u>exposure</u> over long periods of time are quite meaningful and quantifiable in terms of overall community response.

5. IH is in error in stating that their estimates of benefits are ultraconservative since EPA's identified level of 55 dB to protect public health and welfare includes a built-in margin of 5 to 7 dB below a level of significant community complaint reaction. The EPA identified level was agreed upon by internationally recognized experts as a level below which the U.S. population would not be at risk from noise exposure. Recent community survey data suggest the identified value of 55 dB may be too high.

GENERAL ADVERSE RESPONSE BASELENE ANALYSES NO REGULATIONS オレ

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GENERAL ADVERSE RESPONSE

TRUCKS REGULATED to 83 dB (1978)

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•	1998	LNP	40.27	17.31 20.77 5.59	10.74 17.65 3.38	12.32 19.58 3.85	6.31 16.86 1.93	4.10 14.33 1.16	4,30 13,54 1,26	8.38 13.19 2.48	2.67 0.75 0.62	106.40 12.69 32.75			•	
•	1990	EXPOSED>	42.16	18 14 21 22 5 85	11,26 18,03 3,53	12.65 19.98 3.95	6-48 17,18 1,98	4,21, 14,68 1,19	4.44 13.83 1.29	8+65 13+45 2+55	2.81 0.77 0.65	110.80 . 13.13 34.06			•	
	1995	EXPOSED> N11, X > LWP > 3	47.42 23.17 14.02	20.36 22.66 5.63	12.65 19.28 4.01	13.59 21.37 4.29	·· 6.97 18.37 2.15	4.56 15.79. 1.30	4,81 14,87 1,41	9.42 14.42 2.77	3.23 0.84 0.75	123.02 14.01 38.14				
	2000	EXPOSED> ( N1J+ % > LWP > ()	52,99 24,91 16,81	22.69 24.27 7.50	14.11 20.70 4.54	14.58 22.95 4.67	7.50 19.75 2.34	4.92 17.03 1.43	5.20 16.04 1.55	10.20 15.56 3.01	3.72 0.93 0.88	135.93			•	
	2010	EXPOSED> ¹⁴ N11+ # >	1 64.58 26.22	27.37 27.28	17.02	16.42 25.95	8 • 49 • 22 • 38	5.5d. 19.51,	5.90 18.25	11.67 17.72	4.83 1.10	1 1.161.80 1 16.86,				
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المراجع المراجع المحافظ المنافع والمراجع المراجع المراجع والمحاجب المحافظ والمحافظ والمحافظ والمحافظ والمحاف

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بالاس سيرتبه متارحة متقاومهم

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			1907 - 19 19												
	1990	I LHPOSEDS	42.16 21.59 13.06	18.14 21.22 5.85	11.26 11.03 3.53	12.65 19.98 3.95	6.48 17.18 1.98	4.21 14.68 1.19	4.44 13.83 1.29	8145 13.45 2155	2.81 0.77 0.65	110.80 13.13 34.00			
-	1995	EXPOSED> N11, <b>X</b> > LWP >	47.42 23.17 14.82	20.36 22.66 6.63	12+65 19+28 4+01	13.59 21.37 4.29	6.97 16.37 2.15	4.56 15.79 1.30	4.81 14.87 1.41	9,42 , 14,42 2,77	3.23 0.84 0.75	123.02 14.01 38.14			
	2000	EXPOSED>:// N11+ <b>X</b> . >' LHP > ':	52.99 24.91 16.61	22+69 24-27 7-50	14.11 20.70 1.54	14.58 22.95 4.67	7.50 , 19.75 , 2.34	4.92 17.03 1.43	5.20 16.01 1.55	10+20 15,56 3+04	3.72 0.93 0.88	135.93 15.00 42.76			
	2010	EXPOSED> (	64,58 20,22	27.37   27.28	17.02	16.42 25.95	1- 5-49   - 22-38	5.53 19.51	5.90 18.25	11.67	•.83 1.10	161-88 16-86			
	[ ]	LHP >	21.02	9.34	5.67	5-44	2.73	1 • 6d.	1.81	3,56	1.17	52.43			o S
				4			· · · · · · · · · · · · · · · · · · ·			••• · · ·	, , , , , , , , , , , , , , , , , , ,				5 J
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والمرجعين متوادي متراور المتر

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		тан Тан	LE E IMPACT	METRICS BY F	LOADWAY TYPE	. IN MILLIDH	5				+TRUCK 503	209/11/80+	•	•
		YEAR	VAR LABLE			ROADHAY	TXPE, K		6	101AL ALL TYPES			o	•
•	) . 	1974	LAPOSED> IMPACTED>	2.43 2.43 2.43 1.83	2.02   2.02   2.02   1.40	11.53 11.53 6.07	16.01 16.01 5.48	14.45 14.45 14.45 3.71	35.67.1 35.67.1 7.18.1	62:11 82:11 25:67				•
•		3951	LHP IXPOSED> IMPACTED> LWP >	2.63 2.63 2.02	2.20   2.70   1.52	12.30   12.30   12.30   6.63	17.20 17.20 6.12	15.71 15.71 4.17	42.45 42.45 8.51	92.50 92.50 28.96			; ; ;	•
		1964	I CAPOSED>     IMPACTED>     LMP >	2.72 2.72 2.72 2.11	2 • 28 · 2 • 28 · 2 • 28 · 1 • 56 · [	12.65 12.65 6.84	17.73 17.73 6.38	16.22 16.22 4.34	46.45.1 46.45.1 9.23.1	98-05 90-05 30:45			· · · · · · · · · · · · · · · · · · ·	
●, ¹ ● (1)		1986	ГАРО5ЕО>   IMPACIED>   LMP >	2.78 2.78 2.78 2.17	2.33. 2.33 1.58	12.88 12.88 6.98	18.08 18.08 6.57	16.58 16.58 16.56 4.40	49.52 49.52 9.81	102.18 102.18 31.56			)	<b>P</b>
		1986	I LEPOSED> I I HPACTED> I LHP > I	2.84 2.84 2.23	2 • 36 2 • 38 1 • 61	13.11 ³ 13.11 7.14	18.44 18.44 6.76	16.95 16.95 1.4.60	52.67 52.67,1 10.41	106.40 106.40 32.75			د ا	
• •		1090	CXPOSED> INPACTED> LNP->	2.91 2.91 2.29	2.44 2.44 1.65	13.35) 13.35 7.31	18.80 18.80 6.98	17.35 17.35 4.76	55.98 55.96, 11.06	110.80 110.80 34.05			3. ). 3. ).	
		     1995 	EXPOSED> Impacted> LMP >	3.07 3.07 2.46	2.59 2.59 1.77	13.94 13.94 7.88	19.75 19.75 7.67	18.47 18.47 19.33	65.20 65.20 13.03	123.02 129.02 38.14			ر. : ار	
u - 1	.:	2000	EXPOSED> I HPACTED> LHP+.>	3.24 3.24 2.64	2.75 2.75 1.91	14.55; 14.55; 8.52	20.69 20.69 8.43	19.58 19.58 1-4 6.00	75,12 75,12 15,27	135.93 135.93 42.76			ູ່ <b>ວ</b>	
		2010	EXPOSED> IMPACTED> LWP'>	3.59 3.59 3.02	3.09 90.6 05.5	15.79. 15.79. 9.81	22.56 22.56 9.98	21.57 21.57 	95.28 95.28 20.07	161.88 161.88 52.43			•	
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الحاصيا بالركيكية ومصيحا بمصاحبات كالمتعاصيص

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	.,	41	141 9 1 .'	LEVEL-NET	GH1ED P	OPULATION	I 1 N DB	64NG5 46	114F 22							RUCKS	83:09/	11/80			
	. •	LHP	]   		DBA RAI	GE, 108		· · ·										ولي قد على			
	• •		. 2	3	4	5		1 . 1	8	.  . 9	10	   11	12	12 13	TOTAL						
•		I DDA I RANGE	l 91 . l 91 .	88'' 85.	65 82	82. 79.	79. 76.	74	73.	70.	67.2	1   (.4   61.	61. 50.	1. 1.58. 1.55.	-			2 1 1	,		
•		YEAR						L'10NS DI	EVEL+	EIGHTED	PEOPLE					1	∙			•	
*	•	1974	0.0	0.00	0.00	0.19	0.54	1.49	2.47	3.91	1 1 5 <del>2</del> 5 1 5 6	5.49	4.54	2.29	25.6				; ,* •	•	
•	•	1964	C.3	0.00	0.00	0.27	0469	3   ∿1.157    55	2.94	4.60	6 09	6.34	5.50	2.45	30.4		ų.		2	•	
•	-	1986 1966	·0.0	0.00	1 10.0	0.29	0.71	. 1.12	3.02	, 4.73 - 4.ян	6.26	6.56 6.81	5.77	2.58	31.5		\$.			•	
6		1990		0.00	0.02	0.32	. 0.79	*1.77 *	3.24	5.05	6.66	7.06	6.32	2.81	34.0					•.	
<b>6</b>	•	1995	5.5	0.00	0.04	0.11	0.93	2.08	3,70	5.67	7 17	7.78	7.07	3,08	34.1						
6		2000, 2010	3+20	0.00	0.08	0.50	1.12 1.56	3.26	4.27 5.49	6.40 7.95	9.74	E.59 10.22	7.85 9.37	3,35 (; 3,90	42.70		· · · ·	<u>د</u> ۳		•	
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يالى المحمومية بالمحجمة بيونج والربيان الترابي المربع التحار والتراب والتاحية

والمستعمد وماليات والجان ويجرونك وتهتك فانوش تهاتكم

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محروفة مصحف محروب سنجاد

دجريبة سأبدر بوديجسه

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	141	er 13 - 1	POPULATI	ON EXPOS	LD IN DA	DA NO S 🔥	UNVE 55	•						+TRU	CK 58 3 1 0 9	/11/80+	•	
						·	4. D	· · · .	·					· · · ·			•	·
•	PEXP	! ! !	i	DBA RA	NGE, TOB	*: 1.1										ja V	0	
		2	1 iş	4	5	ь	7		9	10	11	12 2	13 🖞	TOTAL'			់ំ	
	I. I DBA RANGE	91. 18.	88. 1 45.	65. 02.	⁸² 79."	79. 76.	76.	73. 70.	70,	¢7. 61.	64. 61.	61. 58.	58. 55.			te. No	<u>ः</u>	•
	YEAR		L	·			LL10#5 0	PEOPLE			·			   	1 1 1.			
•	1974	0.0	0.00	0,00	0.15	0.48	1.30	3.01	5.81	10.00	14.55	20.15	26.64	82.10			; ;	
	1961	0.0	0.00	0.00	0.20	й <b>е о</b>	1+54	. <b>3.</b> 43	6.55	311.16	14.04	22.01	30.14	92,49			v. 1.5	
	1986	0.0	0.00	0.00	0.22	0,61	1.62	3.68	1 7.02	L 11.00	17.43	25.62	32.3	102.17				
	. 1986 -	c.0	0.00	0.01	0,24	0.67	1.74	3.79	7.24	1  . /12 .26	16+09	26/03	35.50	106-39			···· · · · · · · · · · · · · · · · · ·	•
	1990	0.0	0.00	0.02	0.26	0.70	1.83	3.94	7.50	12.69	16.79	28.07	37.01	110.79				
	2000	0.0	9.00	0.06	0.40	1.00	2.52	5.19	9.49	15.52	22.85	34404	44.06	135.92				
	2010	0.00	0.00	et.0	0.57	1.51	3.36	6.6B	11-79	10.51	27.18	41.46	-0.80	. 161 .87.				
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GENERAL ADVERSE RESPONSE TRUCKS REGULATED TO ES dB (1978) TRUCKS REGULATED TO BODB (1982)

LEGHT VENTELLES, MOTORCYCLES AND BUSES NOT REGULATED

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o	TA	BLE 7 AREA	SPEC IFIC	INPACT MET						•	•	• î H	UČKSBOTOVI I Zac	24
° C _i			1	1.		AREA TYPE	• J		·. :/		·			• • •
				2	ý. 3	4	5	6	7	   8	1 29	ALL J		
	I. PLAI	CE SIZE.	.  . QVEK   2000	i 1000- 1. 2000	500- 	   20C-   500 	100-	50- 100,	25- . 50	5- 1 - 25	, , , , , , , , , , , , , , , , , , ,			e 4
	YEAR	VARIABLE,	'   • : 	PEXP AND L	NP IN PI	LLIUNS, N	LÏ (N PERC	ENT.	. • 		:" 			
	1974	LEXPOSED>	29.68 1. 18.77 9.29	, 12+73. 10+59 4+21	7.92 15.79 2.54	   10.45   17.60   3.31	}   .5.40   15.34   1.68	3.47 13.02 1.00	3.56 12.22 1.08	7.07   .11.97   .2.15	1 1.79 1 0.63 1 0.40	82.11 11.85 25.67	4 4 1 1 4	
0	:   . 1941	EXPOSEDS NIL # > LWP >	34.33 15.85 10.78	14 60 19 60 4 82	5.C7 16.66 2.51	11.26 18.55 3.57	.5.80 1.16.13 .1.80	3.76 13.73 1.00	3.05 12.87 1.17	7.54 12.60 7.32	1 t 2.23 0.70 1 0.51	92.50 12.30 28.94		
••	1., 1984	VEXPOSED> NII+ X > LWP > 2	35.75 19.75	15.39, 19.50, 4.99	5.55 16.55 3.01	) 11.44 18.39 3.57	5.47 15.88 1.79	3+79 13+49; 1+08	3.93 12.69 1.14	1 .7.15 12.39 2.30	19, 2.35 0.10 11, 0.54	96.03 12.15 29.57		1
- <b>O</b> 2 C	1986	EXPOSEDS NIL X S LWP	37.15. 15.73. 11.39	15.98 19.46 15.11	9.50 16.51 3.08	11.60 18.32 3.58	5,93 15,74 1.79	3.82 13.35 1.07	4.01 12.60 1.16	7.87 12.28 2.30	2.42 0.70	98+69 12-07 30+03		
	1988	EXPOSED>	.38.40 15.74 11.67	16 - 57 - 1 19 - 47' - 1 5 - 24 - 1	10.26 16.50 3.16	11+77 18-24 3-59	5,99	3.86 13.25 1.07.	4.08 12.54 1.17	B.00 12.20 2.30	2.50 0.70 0.57	L01.45 12.02 30.55		
•	, , ,	EXPOSED>	19.85 19.85 12.01	17 21 1 19 57 1 5 40 1	10.66 16.58 3.25	11.97 18.36 3.63	6.08 15.65 1.80	3,92,1 13,24   1,08	4.17 12.56 1.17	8.15 12.21 2.31	2.59	104.50 12.05 31.24		
•	,1995	EXPOSED>	44.16 20.86 12.35	19 • 1 3 • 20 • 51 • 6 • 00 •1	11.25 17.38 3.61	12.70 19.23 3.86	£ 46 16 35 1,91	4.17 13.08 1.14	4.4/	8.7± 12.78 2.46	2.93	114.62 12.58 34.20		4
	2000	EXPOSED> NILI \$ 2 LWP >	49+31 22+39 15+11	21.31 21.94:1 6.78	13,24 18,63 4,09	13.62 20.61 4.20	6.95 17.58 2.00	4.52   15.01.  1.26	4.85   14.22   1.37	9,52 13.70 2.69	3.37 C.83 . 0.78	126+67 13+46 38+37		
	2010	EXPOSEDS'	59.96. 25.38	25 • 74 1 24 • 71 1	16.04   21.05	15+37 23+33	7.88   19.97	5.17   17.25	5.53   16.25	10.89 15.76	4+37 0+5H	150.95	† , .,	•
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000 12 W.L.D.									ل المعمون "عرب " رجامه مورد الر	e group				
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والمراجع والمتعاقبة المتعادية والمتعادية والمتعادية والمتعادية والمتعادية والمتعادية والمتعادية والمتعادية

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بالمتعاد بدفلت فالع

المرجعة والمرجعة والمراجعة فتحاصرون وترجوه أتراج والمتشاولين والمراجع والمرجع المرجع

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والمحموم والمحموم والمحمور ووادا والانتخار وتكار وللمراجع والمحمور المحموم والمحم والمحم والمحمو والمحموم والمحمو

47.12 2.44 189 5.12 1.04 . • ; ۰. • `. : . . . . 海洋の推進 . . • ないのであるというという . 

TAI	LE 8 (MPAC	METRICS BY: R	UADWAY TYPE	, IN MILLIG	N \$ .		•		*TRUCK580+0%/	11/80*
YEAR	VARTABLE			ROACHAY	TYPE. K			TOTAL ALL Types		
1974	EXPOSED> 	2.43 2.43 1.13	2+02 2+02 1+40	11.53 11.53 6+07	16.01 16.01 16.01	14.45   14.45   14.45   3.71	35.67 35.67 7.18	B2.11 02.11 25.67		
1901	EXPOSED>	2.63 2.63 2.02	2.20 2.20 1.52	12.30 12.30 6.63	17.20 17.20 6.12	15.71 15.71 - 4.17	42.45 42.45 8.51	92.50 - 72.50 28.96		
1984	EXPOSED> IMPACTED> LWP >	2 • 72 • 2 • 72 • 7 • 09 •	2:27   2.27   11:53	12.63 12.63 6.71	17.65 17.65 6.21	15.95 15.95 4.16	44.80 44.80 8.06	96.03 96.C3 29.57	•	
1986	EXPOSED> TAPACTED> LWP >	2.77. 2.77 2.13-	21 31 24 31 14 53	12.85 12.85 6.76	17.95 17.95 6.28	16.11 16.11 4.16	46+69 46+69 9+16	58.69 58.69 30.03	19 10 10 10 10 10 10 10 10 10 10 10 10 10	
1980	EXPOSED> LMPACTED>	2.63 2.69 2.16	24.36 2.36 1.54	13.07 13.07 6.82	18.25 18.25 	16-28 16-28 4-18	48,65 48.65 9.48	101.45 101.45 30.55	•••	
.1990	EXPOSED> IMPACTED> LWP >	2.89 2.89 2.23	2.40 2.40 1.55	13.29 13.29 6.91 	18.57	16.52 16.52 4.23	50.82 50.82 9.06	104+50 104+50 31+24	· · ·	
1995	EXPOSED> 1 IMPACTED> LWP >	3.04 3.04 2.38	2,54   2,54   1,63	13.88 13.88 7.34 (	19.49 19.49 6598 	17+55 17+55 4+60	58.13 58.13 11.32	114.62 114.62 34.20	÷**.	
2000	EXPOSED>	3-21: 3-21: 2-56':	2269 2269 1.76 1.76	14.49   14.49   7.93	20.47 20.47 20.47 1.68	18,62 18,82 15,19	69.99 16.99 13.25	126.67	·	
2010	EXPOSED>   IMPACTED>   LHP >	3.551	3,01   3,01   2,03   	19,72   15,72   9,17   1	22,31   22,31   9,13	21.09   21.09   5.42	05.21   85.21   17.44	150.55 150.55 47.12		
			6.0 10 10					4) • [•]	•	

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0	LUP LUP			DBA RA			*****						~~~** <b>*</b> ~~		- -	•		ר י
Ċ		2   1   1   2		4	5	6	7	`U	4	. 10	11	12	1 13	TOTAL .			•	5
<u>о</u>	DBA RANGE	80.	86 85.	85. 82	82 79	79 76,	7673.	,	70 67.	67. 64.	64 61.	61^ 58	50. 55.		1	•		,
۲. ۲	i ye'ar			I		114		F 45VEL-1	EIGHTED	RECPLE	· · · · · · · · · · · · · · · · · · ·	·			1 1 1	2		1
, c	3974	0.0	Q,00	0.00	0.19	0+54	1-26	2.47	3.01	5.25	5.49	4.54	2.02	25.67	 	,	•	
	1984	0.0	0.00	0.00	0-25	C+65	1+47	2,80	4.43	5.90	6.22	5.41	2.43	29.57		•		
	1.986 1.988	18 0.0 10 0.0	0.00	0.00 0.01	0.25	0.65 0.66	1.46 1.44	2.78	4.44 4.46	15.93 5.98	6.36 6.50	5.61 5.82	2.53 2.64	30.03 i 30.55		•		ſ
L.	1990	0.0	0.00 0.00	.0.01 0.02	0 - 29	· C. 68	1.47	2.80 3.07	4.51 4.90	. 6.07	6.67 7.27	6.C4	2.74 3.00	31.24		۰.		1
G	2000	0.0	0.00	0.05	0.39.1	0.51	1.96	3.52 4.60	5.53	7.31   7.31   7.82	a.03	7-41 8-44	3.25	)   38+37**		•••	1	,
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