IMPACT OF PROPOSED FEDERAL GUIDANCE FOR RADIOFREQUENCY (RF) RADIATION ON NON-BROADCAST SOURCES

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Impact of Proposed Federal Guidance on Non-Broadcast Sources

The impact of proposed Federal guidance on non-broadcast sources was derived through the use of the frequency assignment files for U.S. Government and Federal Communications Commission (FCC) authorized radiofrequency (RF) radiation sources. These files are maintained by the Electromagnetic Compatibility Analysis Center (ECAC), and were processed by ECAC, using criteria supplied by the Office of Radiation Programs (ORP), to assemble a data base (i.e., the EPA Master Data Base) containing frequency assignments having potential environmental significance. This EPA Master Data Base contains frequency assignment records, and for each record, the associated RF radiation characteristics and the predicted power densities which could be produced at specific distances from system antennas. The Master Data Base was separated into the following categories: (1) earth station main beam, (2) earth station off-axis, (3) civilian fixed beam radar, (4) civilian scanning beam radar, (5) military fixed beam radar, (6) military scanning beam radar, (7) other (10.0 kHz to 100.0 kHz), (8) other (100.1 kHz - 30.561 MHz), (9) other (30.5611 MHz - 960.0 MHz), (10) other (greater than 960.0 MHz).

In order to arrive at an estimate of impact, further analysis was performed on the EPA Master Data Base. Power densities, corresponding to Guidance Option 1 (See NPR), were used in the analysis of guidance impact on non-broadcast sources. Records with power densities predicted to exceed the proposed guidance at 100 meters were written into a smaller working file, maintaining the separation of records into categories.

Frequency records within each category in the working file were then sorted by longitude and latitude and the number of unique locations exceeding the guidance counted. This process was repeated for each category and each distance to produce the final statistics. Removal of duplicate locations was only performed within categories, since frequency assignments in a different category are likely to represent different sources even if they occur at the same locations. The intention of this sorting procedure was to identify the number of geographically unique locations at which some equipment may exceed the proposed guidance.

It is common for a single Government source to have several frequency assignments and conversely, a single frequency assignment to be associated with several equipments. This analysis assumes that all Government sources are represented by at least one frequency assignment in the Government Master File. There may be several equipments operating on a single frequency assignment and they may not all be at the same location. Although this data base deficiency may affect the quality of the impact determinations, we are not aware of any other automated data bases containing the necessary information which would permit a more accurate accounting of actual equipments in the field.

The results of this analysis, shown in Tables 1-5 and Figure 1, are interpreted as the numbers of unique, unclassified sites containing emitters predicted to exceed the EPA proposed Federal guidance at the distances shown. Certain qualifications of the above analysis should be pointed out:

1. No attempt is made to sum the power densities in cases where multiple emitters occur at the same site. EPA experience has shown that in most cases multiple co-located non-broadcast emitters do not produce radiation in the same direction at the same time.

2. The results represent sites and not emitters. The sorting methods used in this analysis do not differentiate between multiple frequency assignments for a single source and multiple sources at a single site.

3. Classified sources are not considered in this analysis. However, comparison with the ECAC analysis which did include classified sources indicates that the inclusion of these sources would have a relatively small effect on the results.

Given the qualifications listed above, this analysis indicates a relatively small impact on non-broadcast sources. Only 164 sites are predicted to exceed the stated guidance level at distances of 100 meters when the conservative 20 dB sidelobe reduction factor and 100 percent duty cycle (for shortwave sources) are used in the models (Table 1). When a more realistic 30 dB sidelobe reduction factor and 10 percent duty cycle are employed, the prediction drops to 56 sites (Table 4). The numbers are further reduced at greater distances from the sources. The relatively small number of non-broadcast sites estimated to be impacted at the most stringent of the Guidance options would be further reduced for the other options and therefore, the impact analysis was not repeated.

Table 1 . Summary of analysis of non-broadcast source sites potentially exceeding proposed EPA Federal guidance at 100 meters organized by source category and numbers of frequency assignments

SUMMARY OF ANALYSIS OF NON-BROADCAST SOURCE SITES POTENTIALLY EXCEEDING PROPOSED EPA FEDERAL GUIDANCE AT 100 METERS

	SOURCE CATEGORY	TOTAL # OF FREQUENCY ASSIGNMENTS PROCESSED	# OF FREQUENCY ASSIGNMENTS PROJECTED TO EXCEED GUIDANCE		# OF SITES PROJECTED TO EXCEED GUIDANCE	
		NUMBER	NUMBER	PERCENT	NUMBER	PERCENT
C	CIVILIAN FIXED BEAM RADAR	839	22	2.6	2	0.2
D	CIVILIAN SCANNING BEAM RADAR	594	0	0.0	0	0 0
M	MILITARY FIXED BEAM RADAR	249	12	4.8	7	2 8
N	MILITARY SCANNING BEAM RADAR	1008	5	0.5	5	0 5
O	OTHER (10. KHZ TO 100. KHZ)	169	0	0.0	0	0 0
P	OTHER (100.1 KHZ TO 30.561 MHZ)	10222	458	4.5	70	0.7
Q	OTHER (30.5611 MHZ TO 960. MHZ)	127	59	46.5	33	26.0
R	OTHER (GREATER THAN 960 MHZ)	272	57	21.0	23	8 5
S	EARTH STATION OFF-AXIS	1431	30	2.1	24	1 7
OTALS		14911	643		164	

Table 2 . Summary of analysis of non-broadcast source sites potentially exceeding proposed EPA Federal guidance organized by source category and distance from source

SUMMARY OF ANALYSIS OF NON-BROADCAST SOURCE SITES POTENTIALLY EXCEEDING PROPOSED EPA FEDERAL GUIDANCE

		DISTANCE FROM SOURCE (METERS)							
	SOURCE CATEGORY	100	200	500	1000	2000	5000	10000	20000
C	CIVILIAN FIXED BEAM RADAR	2	2	0	0	0	0	0	0
D	CIVILIAN SCANNING BEAM RADAR	0	0	0	0	0	0	0	0
M	MILITARY FIXED BEAM RADAR	7	6	5	4	1	1	0	0
N	MILITARY SCANNING BEAM RADAR	5	1	0	0	0	0	0	0
O	OTHER (10. KHZ TO 100. KHZ)	0	0	0	0	0	0	0	0
P	OTHER (100.1 KHZ TO 30.561 MHZ)	78	34	8	2	0	0	0	0
Q	OTHER (30.5611 MHZ TO 960. MHZ)	33	9	2	1	0	0	0	0
R	OTHER (GREATER THAN 960. MHZ)	23	12	9	6	5	2	2	1
S	EARTH STATION OFF-AXIS	24	15	9	9	8	5	5	5
	TOTALS	164	79	33	22	14	8	7	6

Table 3. Summary of analysis of non-broadcast source sites potentially exceeding proposed EPA Federal guidance organized by operating agency and distance from source

SUMMARY OF ANALYSIS OF NON-BROADCAST SOURCE SITES POTENTIALLY EXCEEDING PROPOSED EPA FEDERAL GUIDANCE

	DISTANCE FROM SOURCE (METERS)							
AGENCY	100	200	500	1000	2000	5000	10000	20000
FCC	36	25	15	11	8	6	6	6
USAF	55	16	8	7	2	2	1	0
NASA	6	6	4	4	4	0	0	0
USARMY	16	3	1	0	0	0	0	0
ICA	4	4	4	0	0	0	0	0
DPTCOM	2	2	1	0	0	0	0	0
USNAVY	43	22	0	0	0	0	0	0
USCG	1	1	0	0	0	0	0	0
FAA	1	0	0	0	0	0	0	0
TOTALS	164	79	33	22	14	8	7	6

Table 4. Summary of analysis of non-broadcast source sites potentially exceeding proposed EPA Federal guidance organized by source category with an assumption of 30 dB side lobe reduction for reflector antennas and a 10 per cent duty cycle for short wave systems

SUMMARY OF ANALYSIS OF NON-BROADCAST SOURCE SITES POTENTIALLY EXCEEDING PROPOSED EPA FEDERAL GUIDANCE

CALCULATED USING 30 dB SIDELOBE REDUCTION FOR REFLECTOR ANTENNAS AND 10% DUTY CYCLE FOR HF ANTENNAS

SOURCE CATEGORY	DISTANCE FROM SOURCE (METERS) 100	200	500	1000	2000	5000	10000	20000
C CIVILIAN FIXED BEAM RADAR	2	2	0	0	0	0	0	0
D CIVILIAN SCANNING BEAM RADAR	0	0	0	0	0	0	0	0
M MILITARY FIXED BEAM RADAR	4	4	2	2	1	1	0	0
N MILITARY SCANNING BEAM RADAR	0	0	0	0	0	0	0	0
O OTHER (10. KHZ TO 100. KHZ)	0	0	0	0	0	0	0	0
P OTHER (100.1 KHZ TO 30.561 MHZ)	5	2	1	1	0	0	0	0
Q OTHER (30.5611 MHZ TO 960. MHZ)	32	8	1	3	1	1	0	0
R OTHER (GREATER THAN 960. MHZ)	7	6	3	1	0	0	0	0
S EARTH STATION OFF-AXIS	6	6	5	5	5	5	4	4
TOTALS	56	28	12	11	7	7	4	4

Table 5 . Summary of analysis of non-broadcast source sites potentially exceeding proposed EPA Federal guidance organized by operating agency with an assumption of 30 dB side lobe reduction for reflector antennas and a 10 per cent duty cycle for short wave systems

SUMMARY OF ANALYSIS OF NON-BROADCAST SOURCE SITES POTENTIALLY EXCEEDING PROPOSED EPA FEDERAL GUIDANCE

CALCULATED USING 30 dB SIDELOBE REDUCTION FOR REFLECTOR ANTENNAS AND 10% DUTY CYCLE FOR HF ANTENNAS

	DISTANCE FROM SOURCE (METERS)							
AGENCY	100	200	500	1000	2000	5000	10000	20000
FCC	22	17	9	9	6	6	4	4
USAF	26	6	3	2	1	1	0	0
NASA	1	1	0	0	0	0	0	0
USARMY	3	2	0	0	0	0	0	0
ICA	1	0	0	0	0	0	0	0
DPTCOM	2	1	0	0	0	0	0	0
USNAVY	0	0	0	0	0	0	0	0
USCG	1	1	0	0	0	0	0	0
FAA	0	0	0	0	0	0	0	0
TOTALS	56	28	12	11	7	7	4	4

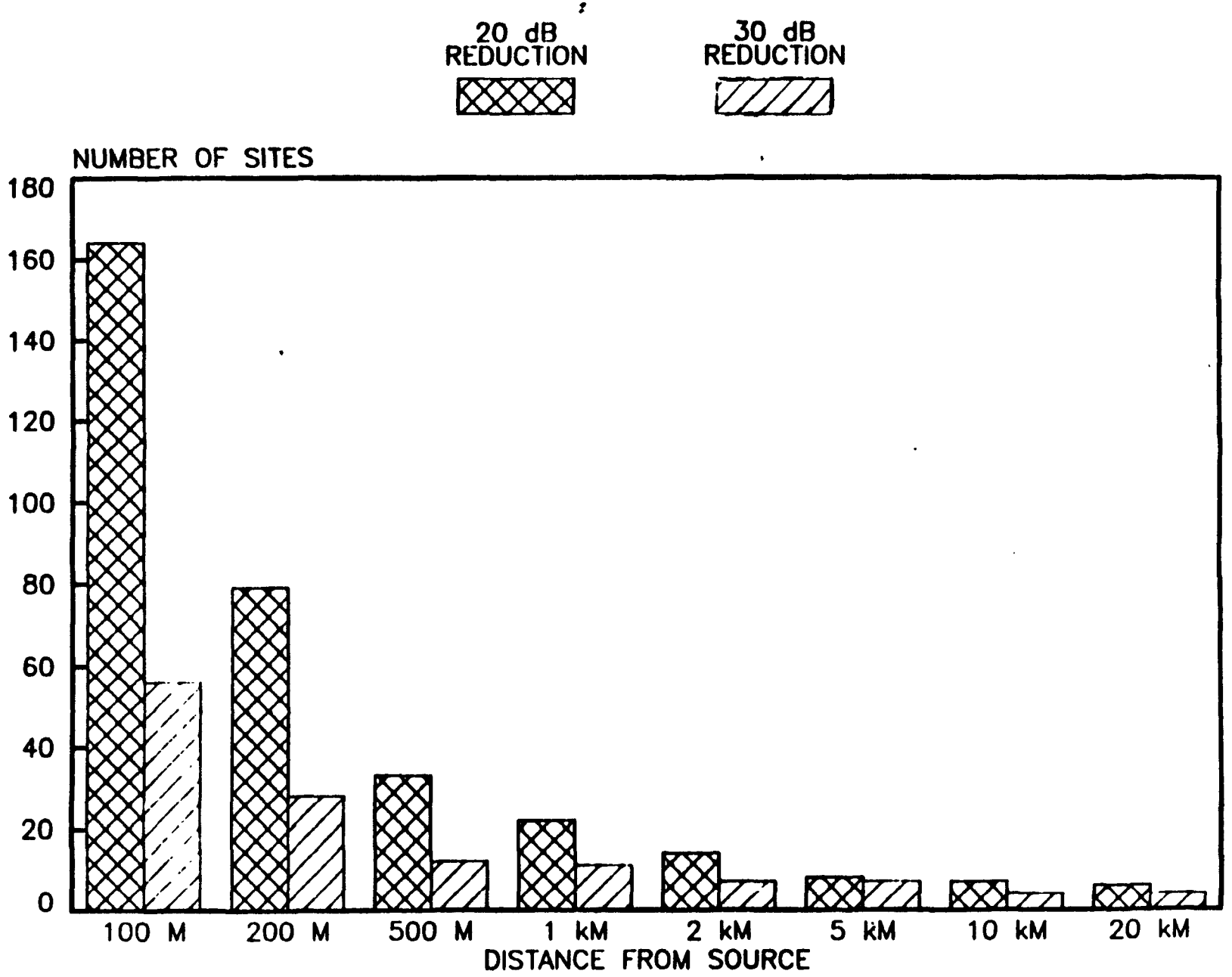

Figure 1. Summary of non-broadcast sources potentially exceeding proposed EPA Federal guidance