MOTOROLA

17th September 2004

Miss Diane Poole
Authorization & Evaluation Division
Federal Communications Commission Laboratory
7435 Oakland Mills Road
Columbia, MD 21046

Re: Form 731 Confirmation Number: EA732233 with FCC ID: AZ492FT4867

Dear Miss Poole;

Motorola Inc., 8000 West Sunrise Boulevard, Fort Lauderdale, Florida, herein submits its response to the 20th August 2004 for information in Correspondence Number 27437.

Q1)   Section 6.1.1 first paragraph does not mention the configurations that are first used prior to the measurements in the second paragraph. Also, please double check the accuracy of the distances stated in the note of the second paragraph. Update as appropriate.

R1)   Each antenna was positioned on the center of the trunk and tested directly behind the vehicle (position 1) as to represent a by-stander. Each antenna type (¼ and ½ wave) was tested across the frequency range of the device. Additional frequencies were tested based on the above results and for antennas with a limited frequency range. The overall highest configuration (antenna and frequency) was then tested at two additional by-stander positions: 2) off the corner of the trunk (45 degrees from position1) and 3) the side of the trunk (90 degrees from position 1).

The distances noted in section 6.1.1 are correct and agree with Appendix A.

Q2)   Please justify use of occupational exposure for use under Part 22 (Public Mobile Services).

R2)   FCC Rule Part 22.651 and 22.653 describes Trunked Mobile Operations in the 470-512 MHz band. Also, Rule Part 22.675 lists the UHF channels for conventional Rural Radiotelephone where the UHF channels may be assigned for use by relay stations in systems where it would impractical to provide rural radiotelephone service without the use of relay stations.

Q3)   Installation instructions consistent with the RF exposure evaluation could not be located. Please provide.

R3)   The Installation Manual (See attached Exhibit 8) requires use of only approved antennas and contains a web page link to view the list. The

approved antennas are those evaluated and reported on in the MPE/SAR report as part of this filing.

Q4)   Please detail the duty factor and signal characteristics for the data mode of the radio.

R4)   The duty cycle varies depending on the loading of the system. The data mode is packet based with the maximum packet size of 1500 bytes. The duty cycle will always be less than 10 % because of the system design restrictions and the normal operating parameters of the radio. The radio and system in which it operates on is never intended to allow a streaming data mode.
The standard APCO signaling as specified in TIA/EIA 102.CAAA paragraph 1.3.3.5 with C4FM modulation is utilized.

Q5)   Please provide an additional summary table showing partial body MPE averaged over the upper half of the body for the roof top configurations and for the high gain antenna mounted on the trunk.

R5)   We respectfully note that this compliance assessment would not require considering partial body average. The wavelength of the radiated field is not short enough compared with the antenna and the relevant portions of the car affecting the bystander exposure so as to produce a shadow region for the electromagnetic field.

Q6)   Please provide details of each of the three SAR scan made include contours and calculation string to obtain the final reported values.

R6)   Scan details: for this filing, only the passenger with trunk mounted antennas HAE4003A and HAE6015A produced noncompliant MPE results. The number of reported scans was increased to include both these antenna conditions that produced highest peak 1-g or whole body average SAR. Therefore a total of two scans are reported (Fig. 4 and Fig. 5).

Calculation string: the SAR is computed and averaged by XFDTD according to the method illustrated in the appendix titled "specific information for SAR computations". In that appendix, point 9a recites "The twelve E-field phasors at the edges of each Yee voxel are combined to yield the SAR associated to that voxel. In particular, the average is performed on the SAR values computed at the 12 edges of each voxel. Notice that in XFDTD™ the dielectric tissue properties are assigned to the voxel edges, thereby allowing said averaging procedure." Point 10a recites "XFDTD™ computes the Specific Absorption Rate (SAR) in each complete cell containing lossy dielectric material and with a non-zero material density. To be considered a complete cell, the twelve cell edges must belong to lossy dielectric materials. The averaging calculation uses an interpolation scheme for finding the averages. Cubical spaces centered on a cell are formed and the mass and average SAR of the sample cubes are found. The size of the sample cubes increases until the total mass of the enclosed exceeds either 1 or 10 grams. The mass and average SAR value of each cube is saved and used to interpolate the average SAR values at either 1 or 10 grams. The interpolation is performed using two methods (polynomial fit and rational function fit) and the one with the lowest error is chosen. The sample cube must meet some conditions to be considered valid. The cube may contain some non-tissue cells, but some

checks are performed on the distribution of the non-tissue cells. A valid cube will not contain an entire side or corner of non-tissue cells." Point 12b recites" The input impedance and the total power radiated under the impedance match conditions that occur at the test frequency are provided by XFDTD™. XFDTD™ computes the input impedance by following the method outlined in [8], which consists in performing the integration of the steady-state magnetic field around the feed point edge to compute the steady-state feed point current (I), which is then used to divide the feed-gap steady-state voltage (V). The net rms radiated power is computed as

$$P_{XFDTD} = \frac{1}{2} \text{Re}\{VI^*\}$$

Both the input impedance and the net rms radiated power are provided by XFDTD™ at the end of each individual simulation."

Q7)   Appendix title "specific information for SAR computations" mention that the vehicle used perfect conductors. Please detail how the passenger seats were handled. Passenger seats are typically not conductive.

R7)   To further clarify how the passenger seats were handled for the SAR computational assessments; page 12 of Appendix D was revised as follows: "The car model is constituted by perfect electric conductor" and "The passenger model is surrounded by air, as the seat, which is made out of poorly conductive fabrics, is not included in the computational model."

Q8)   Appendix title "specific information for SAR computations" mentioned that the antenna was modeled with a 1 mm radius wire. Please justify since the antenna photographed appear to be much larger.

R8)   The Appendix titled "specific information for SAR computations" reports that "The voxel size in all our simulations was 5 mm, and the antenna radius is always at least 1 mm (1 mm for the short quarter-wave antennas and 1.5 mm for the long gain antennas), so there was no need to specify a "thin wire" material". The pictures (Appendix D pg 8) show the HAE4003A antenna, which has a radius of about 1 mm and HAE6015A antenna which has a radius of 1.5 mm. Page 7 of Appendix D was revised with the following sentence: "Because the field impinges on the bystander or passenger model at a distance of several tens of voxels from the antenna, the details of antenna wire modeling are not expected to have significant impact on the exposure level."

Q9)   Appendix title "specific information for SAR computations" mentioned that modeled and measured values were compared. Measured values could not be located. How were positions of both measurement and modeling controlled/determined. Please provide additional details of both measurement and computation to allow thorough comparison. Also, if available please provide similar validations for external to the vehicle.

R9)   The pictures and the tables showing the simulated electric and magnetic fields at the rear seat are shown in appendix D on page 13 and page 14. The

corresponding average value of the average equivalent power density of those simulated field is compared with measured MPE value.

Q10)   Please justify that exhibits provided demonstrate compliance under Part 80 usage.

R10)   FCC Rule Part 80.373 (g), Private Communication Frequencies, describes carrier frequencies assignable for ship-to-ship and ship-to-coast private communications. On board communications are on UHF paired frequencies, i.e. 457.525/467.750 MHz.
Also, Rule Part 80.375 (c) uses 454/459 MHz frequencies which are authorized for offshore radiolocation and associated tele-command operations under the ship's station license.

Q11)   Please confirm that 20 cm spacing to vehicle was worst case for MPE measurements. Were scans made at other distances to verify?

R11)   Distances greater than 20cm from the vehicle would decrease MPE results therefore measurements at greater distances are not necessary. IEEE std C95.1 recommends not making measurements of less than 20cm from a re-radiating object.

Q1)   Please update the antenna installations to included vehicle requirements consistent with the compliance testing preformed. Particularly dimensions to assure spacing requirements similar to the only included about the passenger seat.

R1)   Installation manual states "Be sure that the distance from the antenna location on the trunk lid will be at least 85cm (33 inches) from the front surface of the rear seat-back to assure compliance with RF Energy Safety standards." The 85cm distance between antenna and rear seat passenger is illustrated in Appendix A of MPE report.

Installation instructions are now attached. See Exhibit 8.

Q2)   The user manual contains reference to a large number of antennas that were not evaluated. Please justify inclusion.

R2)   The webpage referenced in "Product Safety and RF Energy Exposure Booklet for Mobile Two-Way Radios Installed in Vehicles or as Fixed Site Control Stations" for approved accessories groups antennas based on frequency range i.e. VHF, UHF Range 1 and 2 and 7/800MHz. All antennas listed under range 2 (450-520MHz) were tested and included in the MPE report.

Q--)   Only E field values appear to be measured. Please explain why H field was not measured.

R--)   IEEE std C95.1 recommends measuring both E and H fields for frequencies less than 300MHz. The device for this filing has a frequency range of 450-520MHz and therefore H field measurements were not performed.

Contact me at (954) 723-5793 if you require any additional information.

Sincerely,
/s/ Mike Ramnath (signed)
Manager, Regulatory Compliance
Email: Mike.Ramnath@motorola.com