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October 13, 2004

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street SW
Washington DC 20554

**Re: Geophysical Survey Systems, Inc.,
Request for Waiver of Section 15.509(d) of the Commission's Rules**

Dear Ms. Dortch:

Pursuant to Section 1.3 of the Commission's Rules, on behalf of Geophysical Survey Systems, Inc. (GSSI), I am filing the original and four copies of this request for waiver of Section 15.509(d) as to the emissions limits applicable to non-contact ground penetrating radars (GPRs).

GSSI's grounds are identical to those set out by Wavebounce in its waiver request of July 6, 2004, as supplemented on August 16, 2004.¹ The waiver conditions suggested below are similar to those proposed by Wavebounce, with minor differences as noted.

Background

There are two main categories of GPRs: ground coupled and non-contact. Ground-coupled GPRs operate within a few centimeters of the ground and are typically pushed by hand at walking speeds. Non-contact GPRs are most often towed behind a vehicle to inspect transportation facilities such as roadways, bridges, rail beds, and airport runways.² They must clear the surface being examined by 40 cm or so to avoid damage from bumps and curbs.

¹ *Office of Engineering and Technology Declares Wavebounce Request for a Waiver of Part 15 to Be a "Permit-but-Disclose" Proceeding for Ex Parte Purposes*, ET Docket No. 04-374, DA 04-3039 (released Sept. 22, 2004).

² When the shuttle is flying, NASA uses non-contact GPRs to inspect the runway before every landing.

Non-contact GPRs necessarily produce higher spurious emissions than ground-coupled GPRs. First, although the shape of the transducer antenna elements directs the majority of the transmitted energy downward into the ground, the relatively wide gap under the moving antenna results in energy reflection from the ground surface and nearby objects. Second, the purpose of non-contact transducers is high speed data collection. Higher speed requires higher pulse repetition frequencies (PRFs) to maintain the needed target resolution. But emissions levels vary directly with the PRF, so that higher speeds necessarily entail higher emissions.



Figure 1
Non-Contact GPR (model 4105 shown)

GSSI manufactures compliant non-contact models at center frequencies of 1 GHz and 2 GHz.³ (The 1 GHz model had to have transmitter power reduced by 20 dB to achieve compliance.) The current rules limit both transducers to a PRF of 100 kHz at the current transmitter power specification, as anything higher exceeds the emissions limits. Obtaining a useful resolution at that PRF requires towing at speeds below 12 miles/hr. That in turn requires closing off traffic lanes on highways and bridges, which greatly increases the risk of accident. Low speeds also complicate the inspection of airport runways and rail beds, because the work can be done only at times when aircraft and rail traffic will not be disrupted. Worse, all of these considerations become disincentives to needed inspections. The same factors also raise costs sharply, and hence limit the number of inspections possible within a given agency budget.

The requested waiver of emissions limits will accommodate higher PRFs that allow speeds of approximately 60 miles/hr. This will enable towing vehicles to move with highway

³ Model 4108 (1 GHz) is certified under FCC ID QF74108F. Model 4105 (2 GHz) has a certification pending under FCC ID QF74105.

traffic, which is safer, less disruptive, and less expensive than low-speed operation, and will facilitate inspections of busy rail and airport facilities.

Public Interest

Non-contact GPRs offer the only practical way to identify underground defects in transportation roadways, bridges, runways, and rail beds surfaces before they cause accidents. Non-contact GPRs save lives. As explained above, the waiver will permit safer, less expensive, and more frequent inspections.⁴

Elements of the Waiver Requested by GSSI

GSSI seeks a waiver of Section 15.509(d) (GPR emissions limits) as they apply to non-contact GPRs. We propose terms similar to those requested by Wavebounce, namely:

1. The equipment will comply with the emissions levels in Section 15.209, subject to all other UWB requirements. The equipment will also comply with Section 15.209(e) (on narrowband emissions in the GPS bands).
2. Use of a device will cease immediately on notification that it is causing interference to GPS, air traffic navigation, control or communications transmissions, or any licensed operation.
3. GSSI will limit manufacture for use and sale in the United States of all models under the waiver to not more than 100 units combined in any calendar year.⁵ (We expect many of these will replace older models in use, and so will add only marginally to the total fleet.)

⁴ On September 30, 2004, GSSI was awarded a contract from the Federal Railroad Administration to develop the use of GPR for railroad ballast inspection. The primary goal is improving safety by identifying anomalies below the track for repair before they cause train derailment. GSSI's partners and subcontractors are the University of Illinois at Urbana-Champaign (the premier railroad engineering program in the country) and Sperry Rail, a Connecticut company that has been inspecting track for railroads for 70 years. Both Sperry and the University will use FCC-certified GSSI systems to collect data. The waiver will enable them to carry out their mission while spending less time on active tracks.

⁵ This element differs numerically from the Wavebounce request.

4. Users of the waived equipment will be required to register under Section 15.525.⁶
5. GSSI will inform purchasers that devices certified under the waiver may not be used within 500 meters of a major airport in the absence of advance coordination with the airport.

Lack of Interference Potential

The waiver cannot realistically cause interference to other services for the following reasons:

- Even under the waiver, emissions at any frequency will be no higher than those permitted for hundreds of millions of Class B digital devices.
- There are very few non-contact GPRs in use nationwide, averaging well under one per U.S. county, so that aggregation of emissions cannot occur.
- Because a waiver will permit non-contact GPRs to move at 60 miles/hr, any interference that did occur would be a brief, one-time transient event.
- Non-contact GPRs have been in regular use at the requested emissions levels for approximately 30 years without any known incidents of interference.

Each of these reasons taken individually provides adequate assurance that GPRs certified under the waiver will be safe. In combination, they reduce the chance of interference essentially to zero.

Waiver Standard

The Commission assesses waiver requests according to the standards set out in *WAIT Radio v. FCC*.⁷ In that case, as here, the applicant sought to operate in contravention of the rules

⁶ Wavebounce also offers to have its users register under the rules applicable to grandfathered GPR equipment. GSSI will do likewise, but we believe those rules are coextensive with Section 15.525 when applied to certified equipment. See *Ultra-Wideband Transmission Systems*, 17 FCC Rcd 13522 at para. 6 (2002).

⁷ 418 F.2d 1153 (D.C. Cir. 1969). E.g., *2002 Biennial Regulatory Review*, 18 FCC Rcd 13620 at para. 85 n.130 (2003) (citing *WAIT Radio* as "setting out criteria for waivers of

while explaining how the purpose of the rules would be met nonetheless.⁸ The court required the Commission to consider the request:

[A] general rule, deemed valid because its overall objectives are in the public interest, may not be in the "public interest" if extended to an applicant who proposes a new service that will not undermine the policy, served by the rule, that has been adjudged in the public interest.⁹

Thus, waiver is appropriate where the applicant maintains the public interest in the underlying rule. GSSI does so here. It will fully achieve the purpose of Section 15.509(d) -- avoiding interference due to excessive emissions -- through limited deployment, rapidly-moving emitters, and advance coordination. And GSSI will further the public interest by directly advancing safety in the inspection of transportation facilities. The requested waiver fits easily within the boundaries drawn by *WAIT Radio*.

Moreover, the Court of Appeals emphasized the importance of waiver procedures as part of the regulatory scheme:

The agency's discretion to proceed in difficult areas through general rules is intimately linked to the existence of a safety valve procedure for consideration of an application for exemption based on special circumstances.¹⁰

Thus, it said, "allegations such as those made by petitioners, stated with clarity and accompanied by supporting data . . . must be given a 'hard look.'"¹¹

Commission rules.")

⁸ WAIT Radio operated an AM broadcast station. It was limited to daylight hours so as to afford protection to "white areas" that had no local service, and relied on nighttime skywave propagation from another station. WAIT Radio proposed to transmit at night using a directional antenna that would keep its signal out of the white areas. *WAIT Radio v. FCC*, 418 F.2d at 1154-55.

⁹ *WAIT Radio v. FCC*, 418 F.2d at 1157.

¹⁰ *Id.*

¹¹ *Id.* (citation footnote omitted).

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Here, too, GSSI's request fully qualifies. The "safety valve" of the waiver procedure is needed to make available an important tool for maintaining transportation safety. The requested waiver is in the public interest, not only in terms of benefits to the public, but also in the absence of any realistic possibility of interference. The request is entitled not only to a "hard look" mandated in *WAIT Radio*, but to a grant of the waiver.

CONCLUSION

Non-contact GPRs offer a greatly needed tool for detecting hidden defects in highways, bridges, rail beds, and airport runways before they threaten the integrity of the load-bearing surface. Section 15.509(d) effectively limits the towing speed of these devices to 12 miles/hr. As a result, operation of a compliant device entails the safety hazards and added cost of closing roadway lanes and operating slow-moving vehicles on facilities shared with aircraft and railroad trains. The requested waiver will increase the working speed to approximately 60 miles/hr, reducing costs and hazards, while maintaining an adequate image resolution to locate small defects. The proposed conditions on the waiver, together with an extremely low deployment density, ensure the waiver will not result in interference to other spectrum users. The requested waiver is in the public interest and meets the standard of *WAIT Radio v. FCC*.

In the interest of public safety, and with no realistic possibility of harm, we urge the Commission to grant the waiver promptly.

Respectfully submitted,

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