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Before the
Federal Communications Commission
Washington, D.C. 20554

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In the Matter of	)	
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Amendment of Part 15 of the Commission's Rules To Establish Regulations for Tank Level Probing Radars in the Frequency Band 77-81 GHz	)	ET Docket No. 10-23 RM-11352
	)	
Siemens Milltronics Process Instruments Inc. Request for Waiver for Tank Level Probing Radars under Part 15 of the Commission's Rules	)	ET Docket No. 06-216
	)	
Ohmart/VEGA Corp., Request for Waiver of Section 15.205(a) of the Commission's Rules to Permit Certification and Immediate Marketing of a Tank Level Probing Radar Operating in the Frequency Band 77-81 GHz	)	ET Docket No. 07-96

NOTICE OF PROPOSED RULE MAKING AND ORDER

Adopted: January 14, 2010 **Released: January 19, 2010**

Comment date: [Insert date 90 days after date of publication in the Federal Register]
Reply Comment date: [Insert date 120 days after date of publication in the Federal Register]

By the Commission:

I. INTRODUCTION

1. In this Notice of Proposed Rulemaking and Order (Notice), we propose to modify our rules to allow tank level probing radar (TLPR) devices to operate in the 77-81 GHz frequency band on an unlicensed basis under the provisions of Part 15 of the Commission's rules. Specifically, we propose to modify Section 15.205 of the rules to remove the prohibition on intentional emissions in the 77-81 GHz band for TLPR devices used in closed storage tanks and vessels made of metal, concrete, or material with similar attenuating characteristics, at fixed locations at petroleum and chemical production and storage facilities, and similar commercial and industrial sites.[1] We believe that our proposals herein will enable the development and deployment of high frequency technology that operates more effectively and reliably than existing tank level measuring radar technology in certain applications where precision measurements are needed, and in certain tanks which cannot now accommodate existing technology. We believe that, with appropriate restrictions, such high frequency TLPR devices can operate on an unlicensed basis without causing harmful interference to authorized services in the 77-81 GHz band.

2. Additionally, we are waiving Section 15.205(a) of our rules, subject to certain conditions, to allow Siemens Milltronics Process Instruments Inc. (Siemens), Ohmart/VEGA Corp. (Ohmart/VEGA), and any other responsible party marketing equipment that complies with these

[1] 47 C.F.R. §§ 15.205.

conditions (*e.g.*, Endress+Hauser GmbH+Co. KG (Endress+Hauser)) to manufacture, certify, and market TLPR devices in the 77-81 GHz band for a period of two years or until 180 days following the adoption of a Report and Order in this proceeding, whichever is longer. This action will allow the new TLPR technology to be utilized in the near term while we consider modifying our general Part 15 rules.

II. BACKGROUND

3. TLPR devices are used to measure the amount of various materials contained in storage tanks or vessels. TLPR transmitters are typically mounted on the inside top of storage tanks, and emit radio frequency (RF) signals through an antenna aimed downwards to the surface of the substance contained in the tanks. The TLPR device measures or calculates the time delay between the transmitted signal and the reception of the return echo reflected off the surface of the material being measured to determine the material's level. The radar beam typically bounces and is scattered inside the tank, and is eventually absorbed by the tank's content or walls. In closed tanks made of metal or concrete material, the main emissions outside the tank typically result from the leakage of the escaping radar signal through the transmitter enclosure or through the mounting flange of the TLPR device.[2] However, if the tank is open when the radar is operating, the radar signal can escape through any opening. Further, if the tank enclosure is made of a material that does not significantly attenuate the radar signal, unintentional emissions would also escape through the tank's walls and the radar enclosure.[3] However, at millimeter wave frequencies,[4] signal propagation loss is significant within a very short distance of the source.[5]

4. Most short-range TLPR devices on the market currently operate at 6 GHz, 8-10 GHz, 24 GHz or 26 GHz.[6] TLPR devices that could operate at higher frequencies would use antennas employing narrower beam widths. Narrower beams would avoid extraneous objects located in close proximity to the desired target, such as agitators or filling pipes, thereby resulting in increased accuracy in target resolution.[7] High frequency TLPR devices would thus provide more precise measurements, reducing

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[2] *See Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Equipment for Detection and Movement; Tanks Level Probing Radar (TLPR) operating in the frequency bands 5,8 GHz, 10 GHz, 25 GHz, 61 GHz and 77 GHz; Part 1: Technical characteristics and test methods,* European Telecommunications Standards Institute (ETSI) European Norm (EN) 302 372-1 V1.1.1 (2006-04), (ETSI TLPR Technical Standard) at 30.

[3] *Id.*, at 30. ETSI found that the signal attenuation through a metal tank wall is 5 dB to 10 dB per *micro*meter thickness and the attenuated signal through a concrete tank wall, with or without reinforcement, is negligible because the thickness and natural moisture content of the concrete provide high attenuation at these frequencies.

[4] The term "millimeter wave" is taken from the fact that the wavelength of radio signals for frequencies between 30 GHz and 300 GHz ranges from 10 millimeters down to 1 millimeter.

[5] There is approximately 80 dB of free space attenuation at 3 meters for an 80 GHz signal.

[6] Siemens, Krohne, SAAB Rosemount Tank Radar AB, etc., are FMCW radars manufacturers. Ohmart/VEGA, Endress+Hauser, Inc., Enraf B.V., etc., are pulsed radars manufacturers. *See, e.g.*, Ohmart/VEGA model VEGAPULS 68 operating at 26 GHz, at http://www.ohmartvega.com/en/10899_11092.htm, model VEGAPULS 66 operating at 6.3 GHz at http://www.ohmartvega.com/en/10899_11091.htm; Milltronics model IQ300 operating at 6.3 GHz at http://www.lesman.com/unleashd/catalog/sensors/sensors_iqradar300.html; Siemens model Sitrans LR400 operating at 24 GHz at https://pia.khe.siemens.com/index4936.htm; Endress+Hauser Micropilot FMR240 operating at 26 GHz at http://www.pci-instruments.com/html/micropilot.html; Krohne model BM702 operating at 8.5-9.9 GHz at http://www.trailblazercontrols.com/downloads.htm.

[7] A radar operating at 5 GHz with a 4-inch antenna would illuminate an area with a diameter of 14.4 feet (6.1 meters) in a storage tank 20 feet high, whereas the same radar operating at 24 GHz would illuminate an area with a diameter of only 3.6 feet (1.2 meters). A larger beam width would more likely illuminate and pick up echoes from objects other than the desired target, causing errors and introducing inaccurate readings, thus manufacturers argue that it is necessary to operate with as small a beam width as possible.

storage tank overfill and spilling and minimizing exposure of personnel to high risk materials.[8] Further, higher frequency TLPR devices can employ smaller antennas, enabling them to be installed in tighter spaces and smaller storage tanks than is possible with existing technology, and to accommodate existing small connection flanges more easily.

5. Part 15 of the Commission's rules permits the operation of low power radio frequency devices without an individual license from the Commission. The technical requirements contained in Part 15 are designed to ensure that there is a low probability that unlicensed Part 15 devices will cause harmful interference to authorized users of the radio spectrum. All unlicensed devices operating under Part 15 share spectrum with other users. There are certain frequency bands, referred to as "restricted bands," where unlicensed devices are not allowed to intentionally radiate energy and only spurious emissions are allowed from Part 15 devices. The restricted bands are listed in Section 15.205(a) of the rules. The "restricted" bands below 38.6 GHz are used by licensed services for safety-of-life communications or for radio operations that use very low received levels, *e.g.*, satellite downlinks or radio astronomy.[9] At the time the Commission classified frequency bands above 38.6 GHz as restricted, there were few parties interested in using these bands on an unlicensed basis.[10] Over time, the Commission has allowed unlicensed operation in the 46.7-46.9 GHz, the 57-64 GHz, the 76-77 GHz and the 92-95 GHz frequency bands.[11]

6. Siemens filed a Petition for Rulemaking requesting that the Commission amend its rules to allow TLPR devices to operate in the restricted 77-81 GHz frequency band.[12] The Commission issued a Public Notice soliciting comments on Siemens's request on December 6, 2006.[13] Ohmart/VEGA and Krohne America, Inc. (Krohne) filed comments that generally supported Siemens petition.[14] Krohne suggests that the Commission should consider allowing TLPR devices to operate in a larger portion of the spectrum, *i.e.*, 75-85 GHz band, to harmonize with European rules for such devices.[15]

7. Concurrent with its rulemaking petition, Siemens filed a request for waiver of Section 15.209(a) to allow TLPR operation in the 78-79 GHz frequency band, subject to certain conditions.[16] Ohmart/VEGA and Krohne filed in support of the Siemens' request. Subsequently, Ohmart/VEGA also filed a request for waiver of Section 15.209(a) to allow TLPR operation in the 77-81 GHz band, subject to

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[8] Siemens Milltronics Process Instruments, Inc. (Siemens) Request for Waiver and Petition for Rulemaking (filed Nov. 3, 2006).

[9] Radio astronomy and satellite systems were among the parties allocated to use frequencies above 38.6 GHz at the time.

[10] *See Revision of the Rules Regarding Operation of Radio Frequency Devices Without an Individual License, First Report and Order,* GEN Docket 87-389, 4 FCC Rcd 3493 (1989). *See also,* 47 C.F.R. 15.205(a).

[11] *See e.g., Amendment of Parts 2, 15 and 97 of the Commission's Rules to Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications, Third Report and Order,* ET Docket 94-124, 13 FCC Rcd 15074 (1998). The 57-64 GHz band is open to most types of unlicensed operations, including fixed TLPRs, while the 46.7-46.9 GHz and 76-77 GHz bands are limited to unlicensed vehicular radars and operation within the 92-95 GHz band is limited to indoor applications. *See* 47 C.F.R. §§ 15.253, 15.255 and 15.257.

[12] Siemens Petition for Rulemaking (Siemens Petition), ET Docket 06-216 (filed November 3, 2006).

[13] *See* Public Notice, DA 06-2475.

[14] Comments of Ohmart/VEGA (filed Jan. 5, 2007) and Krohne (filed Jan. 5, 2007).

[15] Comments of Krohne (filed Jan. 5, 2007).

[16] Siemens Request for Waiver and Petition for Rulemaking (filed Nov. 3, 2006). *See also* Public Notice, DA 06-2475.

certain conditions.[17] Endress+Hauser filed in support of the Ohmart/VEGA waiver request and asked that it be granted the same relief.[18] The National Radio Astronomy Observatory (NRAO) states that it would not object to the Ohmart/VEGA waiver if it were granted subject to certain conditions.[19]

III. NOTICE OF PROPOSED RULEMAKING

8. In this Notice of Proposed Rule Making (Notice), we propose to modify our rules to allow the 77-81 GHz frequency band to be used for the operation of TLPR equipment installed inside closed storage tanks made of metal, concrete or other material with similar attenuating characteristics. We propose a limit of +43 dBm on the transmitter's peak equivalent isotropically radiated power (EIRP) and +23 dBm on the transmitter's average EIRP levels for fundamental emissions when measured in a laboratory setting, *i.e.*, not installed in a tank. We propose to limit the radiated emissions from a TLPR device, when installed in representative tanks of each material type, to the general radiated emission limits for intentional radiators in Section 15.209(a) of our rules when measured outside of the TLPR tank enclosure in any direction and at any frequency below 200 GHz.[20] We propose that installation of TLPR devices be limited to commercial usage in fixed locations. We further propose that in order to receive certification, the device be subjected to a compliance test procedure that includes a) testing of the transmitter's characteristics (fundamental emissions and emissions at band edges, etc.); and b) radiated emission testing of the radar installed inside representative storage tanks for each type of tank material.[21] We believe that these proposals have the potential to foster the development of a variety of tank level radar measuring products that will benefit industry by providing better accuracy and reliability in target resolution to identify critical levels of materials such as fuel, water, sewer treated waste and high risk substances, thereby reducing storage tank overflow and spilling while minimizing exposure of maintenance personnel to high risk materials. These proposals would promote greater utility for the 77-81 GHz band without increasing the interference risk to authorized services in the band.

9. *Frequency Band of Operation.* Authorized operations in the 77-81 GHz band currently include radio astronomy (Federal and non-Federal at 76-85 GHz), radiolocation (Federal and non-Federal at 76-77.5 GHz and 78-81 GHz), space research (Federal and non-Federal at 74-84 GHz), amateur (non-Federal at 76-81 GHz), and amateur satellite (non-Federal at 77-81 GHz).[22] These services typically employ highly directional antennas because propagation loss is significant over short distances at these frequencies.

10. Ohmart/VEGA states that although existing TLPR devices on the market operate at frequencies as high as 26 GHz, operation at even higher frequencies would allow use of smaller and more directional antennas, thus increasing accuracy in target resolution and facilitating installation of these radars in facilities used by industries that require precise level measurements.[23] Siemens also states that

[17] Ohmart/VEGA Waiver Request, ET Docket 07-96 (filed April 30, 2007). *See also* Public Notice, DA 07-2518.

[18] Comments of Endress+Hauser (filed July 26, 2007).

[19] Comments of NRAO (filed July 12, 2007).

[20] 47 C.F.R. § 15.209(a). The emission limit above 960 MHz is 500 μV/m as measured at 3 meters from the enclosure.

[21] Devices must be tested for compliance with the Commission's rules and certified in accordance with the rules before they can be marketed.

[22] 47 C.F.R. § 2.106. A search of the Universal Licensing Service (ULS) database shows fifty-four active licenses for millimeter wave 70/80/90 GHz services and zero licenses for amateur services in the 77-81 GHz.

[23] Ohmart/VEGA comments at 12. Process industries include a broad spectrum of industries involved in the extraction of raw materials (fluid or bulk resources), their transport and their transformation.

higher frequencies allow the use of higher gain antennas with narrower beam widths which provide the ability to avoid false measurements caused by internal tank structures.[24] Krohne reports that according to its data, the greater the bandwidth over which the TLPR operates to make its level measurements, the greater the measurement resolution (to distinguish among various in-tank structures) and accuracy (to determine precise storage levels).[25] We agree that opening the 77-81 GHz frequency band to TLPR devices would encourage deployment of devices that would provide higher accuracy and resolution than other conventional level measuring systems and existing TLPR devices operating at lower frequencies.

11. We believe that the proposed TLPR operation will not cause harmful interference to incumbent services in the 77-81 GHz band, based on several factors. First, the general emission limits are 39.6 dB below the emission levels that the Commission previously determined are sufficient to prevent harmful interference in this frequency range.[26] Second, emissions in this band should attenuate more rapidly than the rate predicted by free space propagation due to the greater attenuating effects on radio waves from oxygen, water and any intervening objects at these frequencies; thus, the risk for harmful interference is minimal.[27] Third, TLPR devices would be installed inside tanks which attenuate the radiated emissions so that they would not exceed our general emission limits outside of the tank, as we discuss in more detail below.[28] Further, because TLPR antennas would be pointing down toward the material inside closed storage tanks, side beam leakage should be minimal given the tank enclosure's attenuation coefficient and the absorption characteristics of the material to be measured (liquid or solid); thus, reflected signals should be contained within the tank. Finally, as we discuss below, we are proposing certain operational conditions (regarding emission limits, tank materials, and site locations) that would further reduce the likelihood of harmful interference to authorized services. Accordingly, we believe that TLPR devices would be able to share spectrum with authorized services in the 77-81 GHz band, and we seek comment on what impact, if any, our proposal to allow TLPR operations in this band would have on authorized services.

12. Regarding radio astronomy, we observe that NRAO submitted comments in response to the Ohmart/VEGA petition to request special considerations to protect radio astronomy services, such as a mandatory 2 kilometer distance separation, between any permanent TLPR installation and radio astronomy site.[29] Although radio astronomy has a primary allocation in the entire 77-81 GHz band proposed for TLPR operations, we note that, as discussed above, the Part 15 rules currently allow spurious emissions approximately 39.6 dB higher than the radiated emission limit allowed in Section

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[24] Siemens' petition at 11.

[25] Krohne supplemental comments at 2.

[26] In Docket No. 94-124, the Commission set the radiated emissions limit in the 40-200 GHz band for forward-looking vehicle-mounted field disturbance sensors operating in the band 76-77 GHz is 600 pW/cm^2, which is equivalent to 47600 μV/m at 3 meters. The radiated emissions limit allowed in Section 15.209 of the rules for intentional radiators operating at frequencies above 960 MHz is 500 μV/m at 3 meters, approximately 39.6 dB lower. *See Amendment of Parts 2, 15 and 97 Of The Commission's Rules to permit use of Radio Frequencies above 40 GHz for New Radio Applications*, Third Report and Order, Docket 94-124, 13 FCC Rcd 15074 (1998). Power density (P_D), EIRP and field strength (E) are readily converted through the following formula: $P_D = E^2/120(Pi) = EIRP/(4\ Pi\ D^2)$, where D is the separation distance in meters, provided measurements are performed in the far field.

[27] We also note that there is approximately 80 dB of free space attenuation at 3 meters for an 80 GHz signal.

[28] *See* 47 C.F.R. §§ 15.253(c)(2) & 15.209.

[29] Comments of NRAO in ET Docket 07-96 (filed July 12, 2007). Although NRAO only filed comments on the Ohmart/VEGA waiver petition and not in response to the Siemens' rulemaking petition, we believe that NRAO intended that its comments on separation distance should apply to "any vendor and/or operator of TLPR," and thus we address the separation distance issue in the Notice discussion.

15.209 which we propose to apply to TLPR devices.[30] In addition, vehicle radars, which are subject to the higher emission limits, are more likely to be operating in the vicinity of radio astronomy sites than TLPR devices in tanks at fixed locations. The Commission already determined that the higher spurious emissions would not result in harmful interference, even without requiring a minimum separation distance from radio astronomy sites; operation at a level 39.6 dB lower also should not be a source of harmful interference. Furthermore, radio astronomy stations manage the RF systems used on their properties, and thus they may choose to exclude TLPR devices on their properties. We further note that TLPR devices currently operate under the general non-interference requirements of Section 15.5 of our rules as would those proposed herein.[31] Under these rules, the operator of a TLPR device is responsible for eliminating any harmful interference that may occur or must cease operation upon notification by a Commission representative that the device is causing harmful interference. Thus, we believe that radio astronomy sites would be sufficiently protected. Accordingly, we tentatively conclude that it is not necessary to require any separation distance between a TLPR installation and a radio astronomy site. We seek comment on this tentative conclusion.

13. In response to Siemens' petition, Krohne states that the European Telecommunications Standards Institute (ETSI) provides for operation of TLPR devices in the 75-85 GHz frequency band. It states that ETSI did not specify a 10-gigahertz band simply to facilitate device channellization, but rather, the larger bandwidth is required by TLPR devices to process and resolve the various reflected images within tanks of different sizes and construction.[32] Krohne therefore urges the Commission to harmonize TLPR spectrum use in the United States with Europe and allow TLPR operation in the wider 75-85 GHz band. It further states that such harmonization would promote manufacturing efficiencies and lower costs by allowing a single RF design for worldwide distribution, and that harmonized spectrum rules would eliminate the need to make on-site frequency adjustments which can cause faulty operations and create safety risks (*e.g.* chemical overfill).[33]

14. The 75-85 GHz frequency band encompasses many more incumbent licensed operations than the 77-81 GHz band requested by Siemens.[34] In addition to those services authorized in the 77-81 GHz band identified above, the authorized services in the 75-85 GHz band include fixed/mobile/ fixed satellite (Federal and non-Federal at 74-76 GHz and 81-85 GHz), mobile satellite (Federal and non-Federal at 81-84 GHz), and broadcast and broadcast satellite (non-Federal at 74-76 GHz). In addition, unlicensed vehicle radars are allowed to operate in the 76-77 GHz band.[35] Krohne notes that these regions of the spectrum are similarly allocated in Europe and in the U.S., and ETSI studies have shown that there is little risk of interference from devices which emit at or below the general emission limits for unlicensed radiators.[36] Moreover, Krohne states that TLPR antennas, by design, are directed downward and operate only inside of tank structures which further reduce any risk of harmful interference to other spectrum users. Accordingly, Krohne believes that there is little reason for the Commission not to consider adopting the same spectrum policies for TLPR devices as those that are being followed in Europe. We seek comment on whether we should allow TLPR devices to operate in the 75-85 GHz band, including what impact, if any, such operations would have on authorized users in the band. We invite commenters

[30] *See supra* ¶ 11, footnote 26.

[31] 47 C.F.R. §15.5.

[32] Krohne comments at 4.

[33] Krohne comments at 3.

[34] *See* 47 C.F.R. §2.106. A search of the Universal Licensing Service (ULS) database shows eighteen active licenses for millimeter wave 70/80/90 GHz services in the 75-85 GHz.

[35] *Id.*

[36] Krohne comments at 5. We note that such ETSI studies were not submitted into the record.

to submit into the record any technical studies on the feasibility of allowing TLPR devices to operate in the 75-85 GHz frequency band.

15. *Radiated emission limits.* Siemens requests that we establish a peak EIRP level of +43 dBm for fundamental emissions for TLPR devices at 77-81 MHz, with 10 dB attenuation requirement at band edges and 20 dB attenuation requirement for peak spurious emissions.[37] Siemens proposes that when a TLPR device is installed in a storage tank, the radiated emissions outside the TLPR tank enclosure at any frequency in the range of 40 to 250 GHz be limited to a level of -41.3 dBm/MHz, which is an equivalent isotropically radiated power ("EIRP") level that approximates the general radiated emission limits for intentional radiators under Section 15.209(a) of the rules.[38] Siemens states that protection of co-channel users as well as other spectrum users in the harmonically related bands is assured by compliance of the TLPR device with the Part 15 requirement for intentional radiators (*i.e.*, attenuated to an EIRP level of -41.3 dBm/MHz), as measured *in-situ* outside the tank, and by attenuation of emissions at band edges and spurious emissions, as measured on tests on the radar transmitter by itself.[39]

16. As requested by Siemens, we propose to allow TLPR devices to operate in the 77-81 GHz band at a maximum peak EIRP of +43 dBm. We also are proposing a maximum average EIRP of +23 dBm.[40] This is consistent with the existing provision in our rules which specifies a limit on peak power that is 20 dB greater than the average limit.[41] We also propose to require that when the radar is installed inside a storage tank, the device shall comply with the general radiated emission limits in Section 15.209(a), in any direction outside the tank enclosure. We propose to apply the field strength emission limits in Section 15.209(a), rather than the limit on EIRP requested by the petitioners to regulate emissions radiated from the enclosure. The specification of a limit based on EIRP is appropriate when discussing the level of emissions from a transmitter. However, we believe that the levels of emissions radiated from an enclosure are more accurately characterized by a field strength specification. We seek comment on the above proposals.

17. Siemens suggests limits on radiated emissions outside the TLPR tank enclosure at any frequency in the range 40 GHz to 250 GHz. We note that our current Part 15 rules require measurements of a transmitter from the lowest fundamental frequency up to the fifth harmonic or 200 GHz, whichever is lesser.[42] Measuring above 200 GHz, as Siemens proposes, could require additional specialized measurement instrumentation which may not be readily available. We seek comments on potential problems that might be encountered in measuring emissions above 200 GHz. We further note that if a radar transmitter generates any radio frequency signals below 40 GHz, *e.g.*, if it contains digital circuitry

[37] Vehicle radar systems are allowed a maximum EIRP of +48.3 dBm (60 $\mu W/cm^2$) for vehicles in motion with forward mounted antenna, +45.3 dBm (30 $\mu W/cm^2$) for vehicles in motion with side-mounted antenna and +23.5 dBm (200 nW/cm^2) for vehicles not in motion, at a distance of 3 meters from the radiating structure.

[38] The general emission limit above 960 MHz is 500 $\mu V/m$ at 3 meters. 47 C.F.R § 15.209. Section 15.33(a)(3) requires compliance with the radiated emissions limits of Section 15.209(a) for devices operating above 30 GHz up to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower, unless specified otherwise elsewhere in the rules. 47 C.F.R. § 15.33(a)(3).

[39] *Id.*, at 13.

[40] In most cases, the interference potential is based on the average power of the undesired signal rather than on its peak power. For example, receivers that employ error encoding techniques and receivers with bandwidths that are much narrower than the pulse repetition frequency of the undesired emission have some immunity to peak power levels, responding instead to the average emission levels. *See Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems, Second Report and Order and Second Memorandum Opinion and Order*, OET Docket 98-153, FCC 04-285, 19 FCC Rcd 24558 (2005), at ¶22.

[41] 47 C.F.R. § 15.35(b).

[42] 47 C.F.R. § 15.33(a)(3).

such as a microprocessor, our rules require that measurements be made at frequencies lower than Siemens' proposed 40 GHz lower limit. Similar requirements would apply to digital circuitry associated with the radar's receiver.[43] As such, we believe that the Part 15 rules concerning emissions above and below 40 GHz are adequate for TLPR devices and we do not think that it is necessary to extend the upper measurement frequency to 250 GHz from 200 GHz. We seek comments on this tentative conclusion.

18. *Radar Technique.* We observe that currently TLPR devices typically use either pulsed radar waves or frequency-modulated continuous waves (FMCW). In pulsed radars, short duration pulses are transmitted toward the target and the target distance is calculated using the transit time. In FMCW radars, a continuous frequency-modulated signal is transmitted, and the frequency difference caused by the time delay between transmission and reception indicates the target distance. We believe that there should be no restriction to the type of radar technique used by the device, because the radar technique used does not appear to affect the interference potential of the device, as long as the device is compliant with the emission limits. We note that ETSI does not differentiate between radar equipment using FMCW or pulse in its standard.[44] We are therefore proposing to make available the 77-81 GHz frequency band for use by TLPR devices incorporating any radar technique, subject to the operational restrictions discussed below. We seek comment on this proposal.

19. *Operational Restrictions.* We propose to require that TLPR devices in the 77-81 GHz band be installed in tanks made of metal, concrete or material of similar characteristics that attenuate radiated emissions to the levels we propose above. We also propose to require that a TLPR device be operated only when the tank is closed. We note that in allowing the above emission levels for the transmitter, the ETSI standard specifically states that the TLPR device must be installed in closed metallic tanks or reinforced concrete tanks, or similar enclosure structures made of material with comparable attenuating characteristics.[45] In closed tanks made of metal or concrete material, the main emissions outside the tank typically result only from the leakage of the escaping radar signal through the transmitter enclosure or through the mounting flange of the TLPR device.[46] However, if the tank is open when the radar is operating, the radar signal can escape through any such opening. We also observe that there is a large difference in attenuation coefficient between metal/concrete and plastic or fiberglass material.[47] We are therefore concerned that an open tank or a tank made of material other than metal and/or concrete may allow higher leakage of the radar signals through any opening and through the tank walls, which could potentially cause harmful interference to other radio services. We seek comment on these proposals to restrict the types of tanks these devices can be installed in.

20. While we are proposing to restrict the types of tank materials to metal and concrete, we also request comment on Siemens' request that we allow the tank enclosure to be of any material type (*e.g.*,

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[43] Section 15.33(b) requires compliance measurements for unintentional radiators to be performed from the lowest radio frequency signal generated or used in the device up to a certain upper frequency that is dependent on the lowest frequency generated or used. For example, if the TLPR radar receiver portion uses a microprocessor operating at 1 GHz or above, compliance measurements must be made from 1 GHz up to the fifth harmonic of this frequency, or 40 GHz, whichever is lower. *See* 47 C.F.R. § 15.35(b).

[44] *See* ETSI TLPR Technical Standard at 6.

[45] ETSI finds that the leakage through a metal tank wall is 5 dB to 10 dB per *micro*meter thickness and the leakage through a concrete tank wall, with or without reinforcement, is negligible because the thickness and natural moisture content of the concrete provide high attenuation at these frequencies. *See* ETSI TLPR Technical Standard at 30.

[46] *Id.*

[47] In the 77-81 GHz frequency band, materials such as fiberglass or polystyrene only offer negligible attenuation, whereas ETSI finds that the thickness and natural moisture content of concrete provide very high attenuation at these frequencies. *See* ETSI TLPR Technical Standard at 30; *see also, Radar Surveillance Through Solid Materials,* L.M. Frazier, Paper 2938-20, SPIE Photonics East Conference, Boston, MA (Nov. 1996).

plastic, fiberglass, etc.) We note that at the proposed +23 dBm EIRP average transmitted level, the TLPR signal must be attenuated by at least 64.3 dB in order to meet the equivalent -41.3 dBm EIRP of Section 15.209 radiated emission limit of 500 μV/m at 3 meters. We therefore seek comment on whether we should also allow installation of TLPR devices in tanks made of other types of material of lesser attenuation coefficient, including open-air installations, and if so, what additional measures we should adopt to ensure that TLPR devices installed in such enclosures comply with the limit for radiated emissions outside the tank. Comments should address what additional limitations we should place on such use and any supplemental parameters and measurement procedures we should consider. For example when other tank materials are employed, should a more stringent EIRP limit be imposed on the radar transmitter, and how can it be demonstrated that the material employed provides sufficient attenuation to ensure that the emissions do not exceed the limits in Section 15.209?

21. We also propose to limit installations of TLPR devices to fixed locations in commercial or industrial environments to minimize proximity to authorized services operating in the same frequency band. We seek comment on this proposal.

22. *Compliance Testing.* Siemens suggests a 2-tiered testing approach to ensure compliance of TLPR devices. It proposes that we require the transmitter's output power to be tested to show compliance with the emission limits both in-band and at band edges and with unwanted emission limits. It further proposes that we require that the tank assembly be tested with the transmitter installed inside a representative storage tank at three representative customer's sites for *in-situ* testing. Ohmart/VEGA suggests that testing for compliance with the limits when the TLPR is installed inside the tank could be performed at an open area test site (OATS) as well, rather than *in-situ* at customers' sites.[48] We observe that testing the tank assembly at a test site raises a question of the types of tanks that can be provided by the testing organization, and whether they would be representative enclosures of comparable dimensions. We note that ETSI allows the use of a metallic test tank at a test site.[49] On the other hand, *in-situ* testing would require compliance tests to be performed on a representative tank made of each material type at three representative sites (*e.g.*, a representative metallic tank at three representative sites, a representative concrete tank at three representative sites, etc.), which could prove burdensome to the applicant depending on the various enclosure types that are intended to be used with the radar.

23. We propose to require that TLPR devices be subjected to a compliance test procedure that includes a) testing of the transmitter's characteristics (fundamental emissions and emissions at band edges, etc.); and b) radiated emission testing of the radar installed inside representative storage tanks for each type of tank material. We seek comment on this proposal. We also seek comment on whether testing should be performed *in-situ* with the radar installed inside representative storage tanks at three installations for each type of tank material or if the *in-situ* testing could be replaced by measuring the attenuation characteristics of the type of material proposed to be used for the tank;[50] and performing a radiated emission test at an open area test site (OATS) to demonstrate that the emissions that emanate from any part of the transmitter which is external to the tank, *i.e.*, the portion of the transmitter that is not shielded by the tank material, comply with the Section 15.209 emission limits in all directions.[51] This

[48] Ohmart/VEGA Request for Waiver at 13.

[49] *See* ETSI TLPR Technical Standard at 18, 32.

[50] Test methodologies for measuring electromagnetic shielding enclosures are outlined in IEEE Standard 299-2006. *See IEEE Standard Method for Measuring the Effectiveness of Electromagnetic Shielding Enclosures, IEEE Std 299-2006.*

[51] If it can be demonstrated that the shielding provided by the tank installation is sufficient to reduce the level of the intentional transmission to the Section 15.209 limits, *i.e.*, use of a tank material that provides at least 65 dB of attenuation, the only emissions of concern would be those that leak from that portion of the transmitter assembly that

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alternative procedure would substitute for *in-situ* measurements, reducing the burden for the applicant, while ensuring that the system complies with the applicable emission limits.[52]

24. We also propose to require that TLPR devices designed to operate in the 77-81 GHz band be approved under the Commission's certification procedures and that certification be performed by the Commission rather than by Telecommunications Certification Bodies (TCB).[53] Because a standard test procedure for TLPR devices has not yet been devised, this will enable the Commission to develop appropriate measurement guidelines for devices operating in this frequency band. After the Commission has developed measurement guidelines and gained experience with these devices, it may allow certification by the TCBs. We seek comment on the above proposal.

IV. ORDER

25. We are also granting waivers of the restriction on spurious emissions in the 77-81 GHz band set forth in Section 15.205(a) to Siemens, Ohmart/VEGA, and any other responsible party (*e.g.*, Endress+Hauser) that meets the waiver conditions specified herein. This action will permit TLPR devices to be certified to operate in this band pending the conclusion of the rule making that we are initiating as discussed above. Specifically, we will allow unlicensed TLPR devices that use either pulsed or FMCW techniques to perform level measurements in closed storage tanks and vessels made of metal or reinforced concrete material to operate in the 77-81 GHz restricted band. We will permit these devices to be used in fixed locations at commercial and industrial sites. We find that granting this waiver, subject to certain conditions set forth below, is in the public interest in that it will permit a new generation of TLPR devices with improved accuracy and reliability to be deployed, reducing storage tank overfill and spills and minimizing exposure of maintenance personnel to high risk materials, without increasing the risk of interference to authorized services.

26. Siemens submitted, concurrent with its Petition for Rulemaking, a request for waiver of Section 15.205(a) so that it could obtain FCC certification and market an FMCW TLPR device designed to operate in the 78-79 GHz frequency band.[54] Siemens states that this TLPR device would be used in closed storage tanks made of metal or reinforced concrete, with the same limitations on radiated emissions inside and outside of the tank—*i.e.*, a maximum peak EIRP of +43 dBm inside the tank and an average EIRP limit of -41.3 dBm/MHz outside the tank—as well as the same testing constraints—*i.e.*, testing of the transmitter itself and *in situ* testing—as suggested in its Petition for Rulemaking and as discussed above.

27. Comments in general support of Siemens' request were filed by Krohne and Ohmart/VEGA, with Ohmart/VEGA urging, however, that the rules also be waived for other modulation types such as pulsed radars which it manufactures.[55] Ohmart/VEGA states that pulsed radars are smaller than FMCW devices and provide greater level measurement accuracy in industrial processes that use smaller size

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is external to the tank. Testing for such emissions should be performed with the radar transmitting in a direction away from the measurement instrument and toward RF absorbing material.

[52] The applicant would be required to provide in the certification application information on the types of tank materials (and their attenuation coefficients) it intends to use with the TLPR device.

[53] *See* 47 C.F.R. §§ 2.1031-2.1060.

[54] Siemens Waiver Request, ET Docket 06-216 (filed November 3, 2006.)

[55] Krohne made no specific comments on the waiver and directed most of its comments to the Petition for Rulemaking. Comments of Krohne at 2 and comments of Ohmart/VEGA at 12.

storage vessels and connections.[56] It also states that ETSI has approved a pan-European standard for TLPR devices which covers the FMCW as well as the pulsed radar technology.[57] In its reply comments, Siemens does not object to waiving the rules for pulsed radar technology.[58]

28. Ohmart/VEGA further argues that the waiver should allow operation in four gigahertz of spectrum, *i.e.*, the 77-81 GHz, as Siemens proposed in its Petition for Rulemaking. It believes that the additional bandwidth will result in better resolution and accuracy, and allow for a wider range of applications.[59] Siemens believes that expanding the waiver to a larger band may raise interference concerns to the automotive radar band at 76-77 GHz and to other services in other allocated bands, and that these concerns are more appropriately addressed in a rulemaking proceeding.[60] Siemens requests that the Commission not expand the bandwidth covered by a waiver unless it can do so without delaying a decision on the waiver request.[61]

29. Subsequently, Ohmart/VEGA submitted a waiver request itself, asking for permission to market TLPR devices using either FMCW or pulsed radar modulation to operate in the 77-81 GHz frequency band. That request is similar in many respects to the Siemens waiver, *i.e.*, the TLPR devices would be used in closed storage tanks made of metal, reinforced concrete or any comparable material, with the same limitations on radiated emissions inside and outside of the tank, as well as the same testing constraints proposed by Siemens.[62] Ohmart/VEGA also states that it would accept a limitation on the number of installed units (250 during the first year of the waiver and 500 the second year) and that it would maintain a database listing the locations of all installations, if these conditions would reduce the likelihood of interference to and help resolve any interference complaints in the unlikely event interference to authorized services occurs.[63]

30. Comments in general support of Ohmart/VEGA's waiver request were filed by Endress+Hauser and the NRAO. Endress+Hauser, which also manufactures TLPR devices using pulsed radar technology, fully supports Ohmart/VEGA's request and requests the same waiver under the same conditions.[64] The NRAO states that it foresees little prospect of detrimental interference to radio astronomy from TLPR devices operating in fixed locations at industrial and commercial zones under the Part 15 rules. Nevertheless, NRAO asks that the Commission require that TLPR devices operate more than 2 kilometers (km) from radio astronomy stations conducting single dish spectral line research.[65]

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[56] Pulsed radar TLPRs are smaller because they use lesser amounts of electronic and software signal conditioning. Comments of Ohmart/VEGA at 7.

[57] *See* ETSI TLPR Technical Standard at 6.

[58] Reply comments of Siemens at 2. Manufacturers of FMCW radars include Siemens, Krohne, and SAAB Rosemount Tank Radar AB.

[59] Comments of Ohmart/VEGA at 13.

[60] Reply comments of Siemens at 2-3.

[61] *Id.*, at 5.

[62] Ohmart/VEGA Waiver Request, ET Docket 07-96 (filed April 30, 2007.)

[63] *Id.*, at 15-16.

[64] Comments of Endress+Hauser at 1-2.

[65] Comments of NRAO at 4. Radio telescopes are typically large parabolic ("dish") antenna used singularly or in an array. The largest single dish radio telescope is the Arecibo radio telescope located in Arecibo, Puerto Rico. As we discuss *supra*, NRAO also requests that the vendors and/or operators of TLPR devices be required to refrain from permanently installing such devices in the vicinity of radio astronomy stations and also from expanding the use of TLPR devices to portable operations that could be within the vicinity of radio telescopes. It argues that astronomical observatories are often required to support local infrastructure which may include storage tanks for water, gasoline,

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NRAO endorses Ohmart/VEGA's proposal to maintain a database of relevant TLPR installations and request that such a database a) locate TLPR installations by both postal code and geographic coordinates, and b) contain contact information for the tank or TLPR operator, as well as the date of initial operation of the TLPR device.[66]

31. It is a well-established principle that the Commission will waive its rules in specific cases only if it determines, after careful consideration of all pertinent factors, that such a grant would serve the public interest without undermining the policy which the rule in question is intended to serve.[67] Because the Siemens and Ohmart/VEGA waiver requests raise similar issues, we are consolidating our consideration of them and addressing them together. As discussed below, we find that a waiver of the spurious emissions restriction of Section 15.205(a) as requested by these petitioners will serve the public interest because it will allow deployment of TLPR devices with improved accuracy and reliability and will reduce risks caused by overfilling and accidental spillage of storage tanks, while we consider modifying our general Part 15 rules in the rulemaking proceeding that we are initiating. The second criteria is whether the waiver undermines the policy which the rule in question is intended to serve, *i.e.*, to protect authorized users of the spectrum from harmful interference. We conclude that, with appropriate operational and technical restrictions, a waiver of the restriction on intentional emissions in Section 15.205(a) can be granted for a limited time pending the conclusion of our rule making without increasing the potential for harmful interference, and is therefore in the public interest. These findings apply equally to the requests of Siemens and Ohmart/VEGA.

32. Regarding the frequency band where TLPR operations will be permitted, we find that the potential for interference from TLPR devices to authorized users is essentially the same in the 77-81 GHz band as it would be within only the 78-79 GHz band. We thus see no need to limit TLPR operations to a small portion of the band and will allow them to operate in the 77-81 GHz band.

33. The potential for interference from TLPR devices to authorized users in the band can be balanced by operational and technical conditions. As the Commission has noted previously, the interference potential of non-licensed wideband devices to authorized services can be controlled by several factors.[68] Limits on the average and peak emission levels produced by the devices are one method of controlling potential interference. The potential for interference also can be reduced by limiting the applications for which the devices may be employed and the manner in which the devices may be operated. Here, although we exempt TLPR devices from the restriction on intentional emissions in the 77-81 GHz band, we are requiring them to comply with our existing average radiated emissions limit for devices operating above 960 MHz, *i.e.*, 500 μV/m or the equivalent of -41.3 dBm/MHz EIRP, as measured at 3 meters. Further, we are requiring that TLPR devices mandated and operated under the waiver meet all Part 15 requirements, except for Section 15.205(a), including the 20 dB peak-to-average requirement of Section 15.35(b) which is also a controlling factor on peak emissions.[69]

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oil, etc., that may be accessible by road. The NRAO thus is concerned that TLPR installations in mobile containers would increase the likelihood of interference to radio astronomy. Comments of NRAO at 7.

[66] *Id.*, at 8.

[67] *See WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969).

[68] *See Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems Second Report and Order and Second Memorandum Opinion and Order* (*2nd R&O and 2nd MO&O*), ET Docket 98-153, 19 FCC Rcd 24558 (2004) at ¶ 13.

[69] 47 C.F.R. § 15.35(b). Section 15.35(b) specifies a limit on peak emissions from unlicensed devices of 20 dB above the corresponding maximum average emission limit specified in Section 15.209.

34. We note that Siemens suggests that we require *in-situ* compliance measurements of its TLPR device over the 40-250 GHz frequency band, which is at variance with our rules. As noted above, the Part 15 rules require measurements of the transmitter from the lowest frequency generated within the device up to the fifth harmonic or 200 GHz, whichever is lesser.[70] This could necessitate measurements at frequencies lower than the proposed 40 GHz lower limit if the transmitter contains digital circuitry, *e.g.*, microprocessor, or other circuitry operating at lower frequencies.[71] Since Part 15 requirements are already very comprehensive, we do not believe that it is necessary to widen the upper frequency to 250 GHz, for reasons discussed in the Notice, *supra*. Accordingly, with the exception of Section 15.205(a), we will require TLPR devices operating under this waiver to comply with all applicable standards of Part 15.[72]

35. We further find that allowing controlled deployments of TLPR devices operating under the waiver at fixed locations at industrial sites in metal or reinforced concrete storage tanks will serve the public interest by providing a reliable means of protecting the environment and the safety of employees in industrial processes from the risks of accidental spillage and exposure to high risk materials. These areas would include those that are critical to the country's infrastructure, such as petrochemical and nuclear plants. Deployment of TLPR devices will enhance the security procedures of these areas, thereby facilitating homeland security efforts. We will limit TLPR devices operating under this waiver to closed tanks made of metal or concrete only, for the reasons elaborated above in conjunction with our proposed rule changes.[73]

36. In addition, as noted above, the storage tanks in which the TLPR devices are to be mounted will be at fixed locations, thus increasing the likelihood that they will be located away from and thus not likely to interfere with authorized users in the band. Further, since TLPR installations will be limited to commercial/industrial applications, we believe that such installations will be maintained by trained professionals, as noted by Siemens. Finally, we find that our compliance test procedure will provide assurance that not only the TLPR device's design itself meets the fundamental emissions and spurious emissions requirements in our rules, but that the installation (TLPR device and storage tank) also complies with the rules. We therefore conclude that the above operational restrictions constitute good controlling factors on the scope and scale of use of TLPR devices operating under this waiver, thus minimizing their impact on authorized radio users in the band.

37. Regarding special protections for radio astronomy operations from interference from TLPR operations, we decline to require that TLPR devices operated pursuant to this waiver maintain a separation distance from radio astronomy stations, as requested by NRAO. As we elaborate in the Notice section above, the Commission has already determined that spurious emissions at 39.6 dB higher than the limit in Section 15.209 would not result in harmful interference, even without separation requirements from radio astronomy sites.[74] Further, NRAO states that it does not expect that TLPR devices will cause harmful interference to radio astronomy.[75] We believe that any concerns that NRAO has in this regard

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[70] 47 C.F.R. § 15.33(a)(3).

[71] Section 15.33(a) requires compliance measurements for intentional radiators to be performed from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to 200 GHz for devices operating above 30 GHz. This would include digital device circuitry, *e.g.* a microprocessor, that performs a function as described in Section 15.33(a)(4), *e.g.*, control the functions of the intentional radiator or used for additional control or function purposes other than to enable the operation of the intentional radiator. *See* 47 C.F.R. § 15.33(a).

[72] *See* 47 C.F.R. §§ 15.19, 15.31, 15.33, 15.35, 15.101 through 15.111, 15.201 through 15.209.

[73] *See* ¶19, *supra*.

[74] *See* 47 C.F.R. §§ 15.253(c)(2) & 15.209. *See also* discussion under ¶11, *supra*.

[75] Comments of NRAO at 1.

are adequately addressed with the other operational restrictions we are imposing (*e.g.*, fixed location, commercial/industrial applications) and if harmful interference does occur despite our expectation to the contrary, the TLPR device will be required to be shut down.

38. With respect to Ohmart/VEGA's offer to maintain a database of TLPR installations, we note that Siemens did not make a similar offer. We recognize that TLPR devices operating under this waiver will be fixed installations at commercial or industrial locations, where there likely would be few, if any, radio astronomy sites. Although we believe that interference to radio astronomy is very unlikely under these conditions, we nonetheless will require that, for the duration of the waiver, Siemens and Ohmart/VEGA maintain lists of TLPR installations that will be available to the Commission in the event that an interference complaint is raised by an authorized user. Because customer information is competitively sensitive, we will not require that the lists be publicly available.[76]

39. We will not limit the number of TLPR installations during the waiver period, as Ohmart/VEGA offers. We note that Siemens did not make a similar offer. We find that requiring a limitation on the number of installations by individual TLPR manufacturers is not necessary since we believe that the risk of interference to authorized users is very low. Also, we are imposing a number of conditions on TLPR operation that reduces the likelihood of interference, *e.g.*, fixed location, closed tank operation, metal or reinforced concrete storage tanks, and commercial/industrial locations.

40. We will allow other responsible parties, such as Endress+Hauser, to request certification of TLPR devices in the 77-81 GHz band, provided they meet the conditions described in this Order for operation in these bands. The certification application shall state that the party is seeking approval under the terms and conditions of this Order, and approved devices will be subject to these terms and conditions. If a responsible party cannot attest that its TLPR device meets the terms and conditions of this Order, we will not consider its certification application unless that party has requested a waiver of applicable rules.

41. Accordingly, for a period of two years or for a period of 180 days following the adoption of a Report and Order in this proceeding, whichever is longer, we are waiving the intentional emissions restriction of Section 15.205(a) to allow any TLPR manufacturer to obtain FCC certification for its TLPR devices to operate in the 77-81 GHz band subject to compliance with the following provisions:

1). The TLPR device shall comply with all the technical specifications applicable to operation under Part 15 of 47 C.F.R., with the exception of Section 15.205(a), and shall be certified by the Commission.

2). The TLPR device shall be subjected to compliance testing to demonstrate that:

i. The TLPR device's fundamental emissions shall comply with a peak radiated EIRP limit of +43 dBm and an average EIRP limit of +23 dBm in the 77-81 GHz band.

ii. Emissions from the device appearing outside of the 77-81 GHz band shall be attenuated to at least 20 dB below the highest level of the fundamental emission. The -20 dB bandwidth of the device must be contained within the 77-81 GHz band, under all conditions of operation including the effects from pulsing or other modulation techniques that may be employed as well as the frequency stability of the transmitter over the temperature range -20 to +50 degrees Celsius and an input voltage variation of 85% to 115% of rated input voltage.

[76] Information about certified TLPR devices is publicly available in the Commission certification database. *See* https://fjallfoss.fcc.gov/oetcf/eas/reports/GenericSearch.cfm.

iii. When installed in a storage tank, emissions radiated in any direction from the TLPR shall not exceed the general limits in Section 15.209 of the rules. Testing in a storage tank shall be performed on each type of representative tank.

3). The TLPR device shall be installed in storage tanks made of metal, concrete or material with similar attenuating characteristics only. The tank shall be closed when the radar device is operating. Care shall be taken to ensure that gaskets, flanges, and other openings are sealed to eliminate signal leakage outside of the structure.

4). The TLPR device shall be installed only at fixed locations.

5). The applicant shall maintain a record of installations of the devices it operates or sells under this waiver, including the identity of the customer and the address or geographical coordinates of each installation, for the duration of the waiver. This record shall be made available to the Commission upon request.

V. PROCEDURAL MATTERS

42. *Initial Regulatory Flexibility Analysis for the Notice of Proposed Rule Making.* As required by Section 603 of the Regulatory Flexibility Act, 5 U.S.C. § 603, the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on small entities of the proposals suggested in this document. The IRFA is set forth in Appendix A.

43. *Initial Paperwork Reduction Analysis.* The *Notice of Proposed Rule Making* does not contain proposed new or modified information collection requirements.

44. *Comments.* Pursuant to Sections 1.415 and 1.419 of the Commission's rules, 47 C.F.R. §§ 1.415, 1.419, interested parties may file comments on or before the dates indicated on the first page of this document. Comments may be filed using: (1) the Commission's Electronic Comment Filing System (ECFS), (2) the Federal Government's eRulemaking Portal, or (3) by filing paper copies. *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 Fed. Reg. 24121 (1998).

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the ECFS: http://fjallfoss.fcc.gov/ecfs2/ or the Federal eRulemaking Portal: http://www.regulations.gov.
- Paper Filers: Parties who choose to file by paper must file an original and four copies of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.

  Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

  - Effective December 28, 2009, all hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes must be disposed of before entering the building.
  - Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743.
  - U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

People with Disabilities: To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc.gov or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (tty).

45. *Further Information.* For further information, contact Anh Wride, Office of Engineering and Technology, at (202) 418-0577, or via the Internet at Anh.Wride@fcc.gov.

VI. ORDERING CLAUSES

46. IT IS ORDERED that pursuant to Sections 1, 4(i), 303(f), 303(g), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. Sections 151, 154(i), 303(g), and 303(r), this *Notice of Proposed Rule Making* IS ADOPTED and the Petition for Rule Making by Siemens Milltronics Process Instruments, Inc. filed on November 3, 2006, is hereby GRANTED to the extent described herein.

47. IT IS FURTHER ORDERED that pursuant to authority in Section 1.3 of the Commission's rules, 47 C.F.R. Section 1.3, and Sections 4(i), 302, and 303(e), of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 302, and 303(e), the Request for Waiver filed by Siemens Milltronics Process Instruments, Inc. filed on November 3, 2006, IS GRANTED, consistent with the terms of this Order. This action is effective upon release of this Order.

48. IT IS FURTHER ORDERED that pursuant to authority in Section 1.3 of the Commission's rules, 47 C.F.R. Section 1.3, and Sections 4(i), 302, and 303(e), of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 302, and 303(e), the Request for Waiver filed by Ohmart/VEGA Corp. filed on April 30, 2007, IS GRANTED in part and DENIED in part consistent with the terms of this Order. This action is effective upon release of this Order.

49. IT IS FURTHER ORDERED that pursuant to authority delegated in Section 0.241 of the Commission's rules, 47 C.F.R. Section 0.241, the Office of Engineering and Technology may approve equipment certification applications consistent with the terms and conditions of the waivers granted by this Order for any responsible party that attests and demonstrates in its application that it seeks approval under and satisfies the terms and conditions of this Order.

50. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this *Notice of Proposed Rule Making,* including the Initial Regulatory Flexibility Analysis to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch

Marlene H. Dortch
Secretary

APPENDIX A

Initial Regulatory Flexibility Analysis

As required by the Regulatory Flexibility Act of 1980, as amended (RFA),[1] the Commission has prepared this present Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in this *Notice of Proposed Rule Making* (*NPRM*). Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments provided on the first page of this *NPRM*. The Commission will send a copy of this *NPRM*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).[2] In addition, the *NPRM* and IRFA (or summaries thereof) will be published in the Federal Register.[3]

A. Need for, and Objectives of, the Proposed Rules

This rule making proposal is initiated to obtain comments regarding proposed changes to the regulations for radio frequency devices that do not require a license to operate. The Commission seeks to determine if the standards should be amended to permit intentional emissions in the 77-81 GHz by tank level probing radars (TLPR) to provide better accuracy and reliability in target resolution to identify critical levels of materials such as fuel, water and sewer treated waste and high risk substances. Specifically, we propose to allow intentional emissions in the 77-81 GHz restricted band for TLPR devices used in closed storage tanks and vessels made of metal, concrete or comparable material, at petroleum and chemical production and storage facilities and similar industrial sites. We believe that our proposals herein would enable TLPR devices to provide better accuracy and reliability in target resolution to identify critical levels of materials such as fuel, water and sewer treated waste and high risk substances. The proposed amendments to our rules will permit these devices to operate effectively and reliably, reducing storage tank overfill and spilling while minimizing exposure of maintenance personnel to high risk materials, all without increasing the risk of interference to authorized services.

B. Legal Basis.

The proposed action is taken pursuant to Sections 4(i), 301, 302, 303(e), 303(f), 303(r), 304 and 307 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 301, 302, 303(e), 303(f), 303(r), 304 and 307.

C. Description and Estimate of the Number of Small Entities to Which the Proposed Rules Will Apply.

The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.[4] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[5] In addition, the term "small business" has the

[1] *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. §§ 601 - 612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 847 (1996).

[2] *See* 5 U.S.C. § 603(a).

[3] *Id.*

[4] 5 U.S.C. § 603(b)(3).

[5] 5 U.S.C. § 601(6).

same meaning as the term "small business concern" under the Small Business Act.[6] A small business concern is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.[7]

Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing. The Census Bureau defines this category as follows: "This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment. Examples of products made by these establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment."[8] The SBA has developed a small business size standard for Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing, which is: all such firms having 750 or fewer employees.[9] According to Census Bureau data for 2002, there were a total of 1,041 establishments in this category that operated for the entire year.[10] Of this total, 1,010 had employment of under 500, and an additional 13 had employment of 500 to 999.[11] Thus, under this size standard, the majority of firms can be considered small.

Wireless Service Providers. The SBA has developed a small business size standard for wireless firms within the two broad economic census categories of "Paging"[12] and "Cellular and Other Wireless Telecommunications."[13] Under both categories, the SBA deems a wireless business to be small if it has 1,500 or fewer employees. For the census category of Paging, Census Bureau data for 2002 show that there were 807 firms in this category that operated for the entire year.[14] Of this total, 804 firms had

[6] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small business concern" in 15 U.S.C. § 632). Pursuant to the RFA, the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register." 5 U.S.C. § 601(3).

[7] Small Business Act, 15 U.S.C. § 632 (1996).

[8] U.S. Census Bureau, 2002 NAICS Definitions, "334220 Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing"; http://www.census.gov/epcd/naics02/def/NDEF334.HTM#N3342.

[9] 13 C.F.R. § 121.201, NAICS code 334220.

[10] U.S. Census Bureau, American FactFinder, 2002 Economic Census, Industry Series, Industry Statistics by Employment Size, NAICS code 334220 (released May 26, 2005); http://factfinder.census.gov. The number of "establishments" is a less helpful indicator of small business prevalence in this context than would be the number of "firms" or "companies," because the latter take into account the concept of common ownership or control. Any single physical location for an entity is an establishment, even though that location may be owned by a different establishment. Thus, the numbers given may reflect inflated numbers of businesses in this category, including the numbers of small businesses. In this category, the Census breaks-out data for firms or companies only to give the total number of such entities for 2002, which was 929.

[11] *Id.* An additional 18 establishments had employment of 1,000 or more.

[12] 13 C.F.R. § 121.201, NAICS code 517211.

[13] 13 C.F.R. § 121.201, NAICS code 517212.

[14] U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization," Table 5, NAICS code 517211 (issued Nov. 2005).

employment of 999 or fewer employees, and three firms had employment of 1,000 employees or more.[15] Thus, under this category and associated small business size standard, the majority of firms can be considered small. For the census category of Cellular and Other Wireless Telecommunications, Census Bureau data for 2002 show that there were 1,397 firms in this category that operated for the entire year.[16] Of this total, 1,378 firms had employment of 999 or fewer employees, and 19 firms had employment of 1,000 employees or more.[17] Thus, under this second category and size standard, the majority of firms can, again, be considered small.

We do not expect that the rules proposed in this *Notice of Proposed Rule Making* will have a significant negative economic impact on small businesses.

D. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements

Part 15 transmitters already are required to be authorized under the Commission's certification procedure as a prerequisite to marketing and importation. The reporting and recordkeeping requirements associated with these equipment authorizations would not be changed by the proposals contained in this Notice. The changes to the regulations would permit operation of radar devices used in specific industrial applications in a higher frequency band (77-81 GHz).

E. Federal Rules that May Duplicate, Overlap or Conflict with the Proposed Rules.

None.

[15] *Id.* The census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with "1000 employees or more."

[16] U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization," Table 5, NAICS code 517212 (issued Nov. 2005).

[17] *Id.* The census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with "1000 employees or more."

APPENDIX B

Proposed Rule Changes

For the reasons discussed in the preamble, the Federal Communications Commission proposes to amend 47 C.F.R. part 15 to read as follows:

1. The authority citation for Part 15 continues to read as follows:

Authority: 47 U.S.C. 154, 202, 303, 304, 307 and 544A.

2. Section 15.205 is proposed to be amended by revising paragraph (d)(4) to read as follows:

Section 15.205 Restricted bands of operation.

* * * * *

(d) * * *

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(4) Any equipment operated under the provisions of § 15.253, § 15.255, § 15.256 or § 15.257 of this part.

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3. Section 15.256 is proposed to be added to read as follows:

Section 15.256 Operation within the band 77-81 GHz.

(a) Operation within the 77-81 GHz band is limited to tank level probing radars (TLPR) under the provisions of this section.

(1) TLPR transmitters must be operated only while mounted inside storage tanks or similar structures with antennas directed downward. Such storage structures shall be made of metal, concrete or other material with substantially similar attenuating characteristics. The tank shall be closed during the operation of the intentional radiator. Care shall be taken to ensure that gaskets, flanges, and other openings are sealed to eliminate signal leakage outside of the structure.

(2) Storage tanks or structures housing a TLPR device shall be installed only in fixed locations and in commercial or industrial environments.

(b) The emission levels shall not exceed the following:

(1) Within the 77-81 GHz band, the equivalent isotropically radiated power (EIRP) of the TLPR transmitter without the storage tank shall not exceed +43 dBm peak and +23 dBm average.

(2) Emissions appearing outside of the 77-81 GHz band shall be attenuated to at least 20 dB below the highest level of the fundamental emission. The -20 dB bandwidth of the device must be contained within the 77-81 GHz band under all conditions of operation including the effects from pulsing or other modulation techniques that may be employed as well as the frequency stability of the transmitter over the temperature range -20 to +50 degrees Celsius and an input voltage variation of 85% to 115% of rated input voltage.

(3) Emissions radiated in any direction from the TLPR while installed in the storage tank or enclosure shall not exceed the general limits in section 15.209 of this part.

(4) Compliance measurements for TLPR devices shall be made in accordance with the measurement guidelines specified by the Commission for TLPR devices operating in the 77-81 GHz band.