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Message:

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Multispectral Solutions, Inc.

Progress Report

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File Number 0163-EX-RR-2007 [Reference Number: 5642]

## Introduction

Multispectral Solutions, Inc. (MSSI) in cooperation with BP conducted a series of successful experiments with MSSI's Sapphire DART RFID location awareness system during the period from September 19, 2006 until now. These experiments were conducted under Experimental License 0038-EX-ML-2006.

The trials were conducted at BP's Cherry Point Refinery in Blaine, Washington. The primary purpose of the trials was to test the feasibility of MSSI's Sapphire DART system to improve safety and to meet Occupational Safety and Health Act (OSHA) and Washington Industrial Safety and Health Act (WISHA) regulations. These regulations mandate "control over entrance to a facility by maintenance, contractor, laboratory, or other support personnel. These safe work practices shall apply to employees and contractor employees." Experimental License 0038-EX-ML-2006 permitted the testing of up to 5000 tags. 5000 represents the maximum number of personnel that could occupy the refinery at any given time. The need for this number was driven by the requirement to adequately evaluate the performance of MSSI's localization system and associated software. Most RFID solutions on the market today have a throughput limitation of 100-200 tags.

BP believes that the primary benefit of the Sapphire DART system is safety and the disaster at Texas City has made location awareness even more urgent. Specifically, BP requirements include:

- ? Location of staff that do not show up at assigned mustering points
- ? Improve rescue team response time and their safety
- o Limiting time in hazardous atmosphere, especially when using Self-Contained Breathing Apparatus
- ? Comply with OSHA/WISHA safety regulations
- ? Ensure personnel have proper certifications to enter hazardous areas
- ? Provide safety/maintenance information to personnel based upon location
- ? Track assets for more efficient operations

The trials clearly demonstrated the value of MSSI's system in improving the safety of operations within the refinery. The trials also demonstrated the need for using tags with higher power (e.g. +12.75 dBm above Part 15.250 unlicensed limits for wideband transmissions). Higher power tags are necessary due to the need to locate personnel in an around the extremely high multipath environment of the refinery. The presence of metal tanks, pipes, grates, etc. makes localization extremely difficult without adequate tag transmitter power.

Figure 1. Challenging Refinery Environment

The other benefit of higher powered tags is the reduction in infrastructure complexity and cost. The trials showed that the infrastructure required to locate personnel was significantly reduced because the greater communication range of the tags reduced the requisite number of receivers. The Processing Unit of the Cherry Point Refinery (shown below via an aerial view) covers an area of approximately 6.5 million square feet making personnel localization very difficult and costly if excessive infrastructure is required. MSSl has estimates that only 100 receivers will be required to cover the primary processing area of the facility. This discovery was made during the initial trial and is considered a major breakthrough in enabling a cost effective RFID solution.

Figure 2. Overhead view of BP's Cherry Point Refinery showing planned Receiver Locations

At the conclusion of the initial experiments, BP safety personnel stated to their management, "Based on the test results, the Location Aware Safety System" (built upon MSSl's UWB technology) is the clear direction Cherry Point should pursue. This solution will place us in 100% compliance with PSM regulatory requirements while having minimal impact on the general refinery population. It also opens the door to unlimited possibilities in safety, security and asset management."

Following FCC approval to expand deployment to 5,000 tags, BP Cherry Point Refinery initially distributed about 2300 tags to BP personnel. The broad distribution of tags began in April 2007 where the total number peaked at 4,250 tags. The peak number was in preparation for a Turnaround (a biannual maintenance procedure that included the #1 Reformer and Naphtha Units). After Turnaround, the number of deployed tags decreased to a normal level of approximately 2,300, which covers all regular employees and contractors, as well as 12 visitor badges for demonstration and testing purposes.

Performance, both in terms of accuracy and durability of the MSSl hardware, meets BP requirements. The current location tracking area, which includes the #1 Reformer and Naphtha Units has been tested for over a year with very promising results. However, due to the experimental nature of the installation BP does not consider it to be a production system. As such, it is not in use as an official tool for personnel accounting during an evacuation. The system did clearly demonstrate its value on 17th April 2007 during mock evacuations of the #1 Reformer and Naphtha unit as a training exercise for Turnaround contractors. During these evacuations, observers of the LASS" system could see accurate, real-time, locations of over 1,000 personnel as they fled to the unit perimeter and then departed from the area altogether.

In summary, the experiments of MSSl's Sapphire system have been very successful and serve as the basis for meeting the rigorous demands of personnel safety in heavy industrial environments. In anticipation of meeting BP and other client needs, MSSl applied for a waiver to existing FCC regulations to greater permit use of its technology without the need for temporary experimental licenses.

#### FCC Waiver

On April 12, 2006, MSSl filed a request for a waiver of Part 15 of the Commission's rules to permit a 12.75 dB increase in the peak power for transmitters operating under Section 15.250 in the 5925-7250 MHz band. These transmitters would be used for the tracking and identification of assets and personnel in petrochemical facilities and for the tracking and identification of livestock. The Office of Engineering and Technology declared MSSl's request to be a "Permit-But-Disclose" proceeding for Ex Parte purposes. The proceeding was assigned ET Docket No. 06-103.

On May 24, 2007, MSSl's waiver request was granted permitting the use of higher powered tags in high risk industrial sites such as petroleum and chemical production and storage facilities, power plants, and mines, in order to better track and identify critical assets and personnel. MSSl's request to include livestock tracking was withdrawn as part of the Docket proceedings.

One of the key conditions of the waiver is to automatically deactivate the Sapphire DART transmitter tags

when a tagged item (e.g. an employee or safety equipment) leaves the site where it normally operates.

To meet this requirement, MSSI designed and developed a new tag on/off circuit and exciter module to control the tag. This new hardware is shown below.

Figure 3. MSSI Prototype On/Off Tag Circuit (Left) and Tag Exciter (Right)

The circuit has demonstrated the capability to reliably turn the tag off from a distance of several feet when it leaves a facility without user intervention and to turn it back on when the tag returns. MSSI is currently incorporating other design requirements for the Industrial Safety industry such as form factor, intrinsic safety, environmental specifications, etc. Once the design is finalized, intrinsic safety certification will be required as will certification by the FCC. MSSI estimates that this process will take about six months to complete.

Given the time required for development and certification there needs to be a transition period to allow the existing experimental tags to be used until the new waiver compliant tags are introduced. On September 19, 2007, MSSI requested that its Experimental License (File # 0163-EX-RR-2007) be renewed. Renewal of the experimental license for an additional nine months would provide an adequate amount of time to introduce the new waiver compliant tag design.

#### Conclusion

The FCC originally granted an experimental license to MSSI to permit the novel use of wideband short pulse technology for industrial safety applications at BP's Cherry Point Refinery. The successful results of the experiment lead MSSI to request a waiver to Part 15 rules. This request was approved by the FCC. In the order approving the waiver, the FCC stated, "We find that granting this waiver, subject to certain conditions as set forth below, is in the public interest in that it will permit Sapphire DART systems to operate more effectively and reliably in protecting human life in these high-risk industrial settings, without increasing the risk of interference to authorized services."

MSSI's renewal request for the experimental is intended to permit the continuing use of previously approved tags until such time that new waiver compliant tags can be delivered to BP.