Before the
U.S. DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Washington, DC 20230

In the Matter of	)	
	)	
Request for Comment on	)	Docket No. 010327080-1080-01
Energy, Water and Railroad	)	RIN 0660-XX12
Service Providers'	)	
Spectrum Use Study	)	

COMMENTS OF THE AMERICAN PETROLEUM INSTITUTE

THE AMERICAN PETROLEUM INSTITUTE

By: Wayne V. Black
Katherine C. Lucas
Its Attorneys

and

Randall D. Young
Telecommunications Engineer

Keller and Heckman LLP
1001 G Street, N.W. Suite 500W
Washington, DC 20001
202) 434-4100

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EXECUTIVE SUMMARY

Our nation's petroleum and natural gas companies are authorized by the Federal Communications Commission to operate a variety of telecommunications systems that are used to provide the internal communications capabilities that are crucial to protecting the safety of life, health and property. These communications facilities are critical for the day-to-day operations of these companies, as well as for their response to potentially disastrous, life-threatening emergency situations. Because of the importance of these communications systems, API has participated in all of the Federal Communications Commission's major rule making proceedings that have addressed the use of spectrum in the telecommunications services utilized by the oil and gas industries.

API emphasizes that the private communications systems utilized by the oil and gas industries are essential to meeting the operational, safety, environmental and regulatory compliance obligations of these companies. These companies rely on a combination of predominately spectrum-dependent and, to a lesser degree, non-spectrum dependent technologies to operate their private telecommunications systems. In addition, on a more limited basis, they also employ the use of commercial services as a component of their overall communications networks; however, commercial services are often inadequate to meet the specialized needs of the oil and gas industries.

API unequivocally believes that it will continue for the foreseeable future to have critical needs for these private communications systems. As a component of the Critical Infrastructure Industries with public safety concerns related to their operations, the oil and natural gas industries will require new spectrum allocations to support their energy exploration, production, refining, transportation and distribution activities.

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I. PRELIMINARY STATEMENT

1. The American Petroleum Institute ("API") is a national trade association representing all facets of the petroleum and natural gas industries, ranging from exploration and production, to the transportation, refining, and marketing of those energy sources. API was formed in 1919 to meet the need for a standardization of engineering specifications for drilling and production equipment. Today, API is a forum for all sectors of the oil and natural gas industries to pursue common goals and protect certain public policy objectives. API allows its members to speak with a unified voice about the government and regulatory policies that affect the industry. The API Telecommunications Committee is one of the standing committees of the organization's Information Systems Committee; the Telecommunications Committee evaluates and develops responses to state and federal proposals affecting telecommunications facilities used in the petroleum and natural gas industries.

2. The petroleum and natural gas industries were pioneers in the use of two-way mobile radio for private industrial applications. In recent years, some two-way mobile radio communications needs have been served by commercial providers. Notwithstanding the advent

of additional communications options, as a component of the Critical Infrastructure Industries[1] ("CII"), petroleum and natural gas companies will continue to require Private Land Mobile Radio Services ("PLMRS") and other private radio systems due to the operational, legal and regulatory, geographical, and safety considerations associated with these unique industries.

II. CURRENT SPECTRUM USE

3. Our nation's oil and gas companies are primarily authorized by the Federal Communications Commission ("FCC") to operate facilities in the PLMRS and the Private Operational-Fixed Microwave Service ("POFS"), and, on a smaller scale, in the Ship, Aircraft, Coast and Ground Services[2]. These private radio systems are used to provide the internal communications capabilities that are absolutely essential to protecting the safety of life, health and property, both in connection with day-to-day operations and in response to emergency incidents.

A. Current Spectrum Bands & Spectrum-Dependent Technology

4. Private Land Mobile Radio Service ("PLMRS") systems[3] are used by oil and gas companies to support the search for and production of oil and natural gas, to ensure the safe pipeline transmission of natural gas, crude oil and refined petroleum products, to process and refine these energy sources, and to facilitate their ultimate delivery to industrial, commercial and

[1] The Critical Infrastructure Industries include pipelines, petroleum and natural gas companies, electric, gas and water utilities, and railroads who are represented by API, the American Association of Railroads ("AAR") and the United Telecom Council ("UTC").

[2] Some companies are also the licensees of their own satellite earth stations.

[3] Petroleum and natural gas companies currently operate PLMRS systems in the following spectrum bands: 25–50 MHz, 150–174 MHz, 450-470 MHz, 470-512 MHz, 806-821 MHz, 821-824 MHz, 851-866 MHz, 866-869 MHz, 896-901 MHz, 929-930 MHz, and 935-940 MHz.

residential customers. In fact, there are currently over 34,100[4] licenses authorizing operations on assignments from the former shared Petroleum Radio Services[5] in the frequency bands below 512 MHz. These licenses cover more than 5,000,000 mobile units and 43,000 base stations, which are used to provide support for everyday activities, such as monitoring and communications among workers, as well as to coordinate emergency response activities.

5. Reliable two-way land mobile radio communications systems must be maintained throughout all stages of the exploration, production and distribution process. These systems are used for the direction of personnel and equipment, the control and synchronization of multiple geophysical acoustical signal sources for oil and gas exploration, and the telemetering of geophysical data. Mobile radio also plays a critical role in providing communications for the management of individual wells, in addition to entire fields and pipeline gathering systems, where careful supervision over the operation of valves, pumps, compressors, separation equipment, and local gathering systems is required by federal laws.[6] PLMRS systems are also essential in petroleum refineries to insure the safety of personnel, the adjacent population, and the surrounding environment. Even in the marketing and distribution of these energy sources,

[4] This data only includes licenses held by petroleum industry licensees authorized in the former Petroleum Radio Services, but does not include licenses for operations in bands other than the PLMRS bands, which include: (1) systems operating in the 800 MHz and 900 MHz bands; (2) systems operating in the POFS bands; and (3) systems operating in the unlicensed bands, such as spread spectrum technology governed under Part 15 of the FCC's Rules and Regulations.

[5] In a Report and Order released in 1997, the FCC consolidated the twenty former PLMRS services pools, which included the Petroleum Radio Service, into two broad service categories: Public Safety and Industrial/Business users. Petroleum and natural gas companies currently operate systems authorized in the Industrial/Business Radio service. See generally, Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing Them, *Second Report and Order*, PR Docket 92-235, 12 FCC Rcd 14307 (1997).

[6] See e.g., 49 C.F.R. § 194.107(d)(1)(ii); 49 C.F.R. § 194, App. A; 49 C.F.R. § 195.401(a); 49 C.F.R. § 195.408.

mobile radio continues to play an important role -- whether in the transfer of natural gas at city gates or the loading and delivery of refined petroleum products by rail, tank trucks and marine vessels to customers.

6. It should be noted that the FCC's refarming proceeding has resulted in a reduction of reliable mobile radio communications capacity for the petroleum industry. The principal purpose of refarming is to increase capacity of the PLMRS spectrum by increasing the number of available channels. The purpose of refarming is supported by the growing numbers of mobile radio transmitters being licensed in the PLMRS bands. Further, channel availability was increased by "splitting" the previous channel assignments in half (initially, and half again, ultimately). That is, at UHF, the previous 25 kHz channels were divided into two 12.5 kHz channels, with each channel offset from the previous channel by 12.5 kHz. While this approach certainly creates additional capacity, as discussed later, it does so at the expense of reliability to incumbent 25 kHz systems.

7. Systems in the Private Operational-Fixed Microwave Service[7] ("POFS") serve a variety of vital telecommunications functions, including the provision of communications to remote oil and gas exploration and production sites for voice and data applications, for supervisory control and data acquisition ("SCADA") systems, to communicate with refineries, and to extend circuits to remote pipeline pump and compressor stations. Private microwave networks typically parallel pipeline rights-of-way in order to provide remote communications access to all points along the pipeline system. Moreover, all of the pipeline functions supported by microwave radio have a direct impact on public safety. SCADA systems, for example, are

[7] The spectrum bands currently utilized for use by POFS systems include: 928-929 MHz, 932-935 MHz, 941-944 MHz, 952-960 MHz, 1850-1990 MHz, 2130-2150 MHz, 2180-2200 MHz, 6525-6875 MHz, 17.7-19.7 GHz, 21,200-23,600 MHz, and 24,250-25,250 MHz.

deployed in production fields, pipeline gathering systems, and along pipelines to monitor and adjust various operating parameters. These monitoring functions assist oil and gas companies in preventing leaks and other hazardous conditions, as well as minimizing the impact of those that do occur. Maritime and Aviation systems operated by these industries also enhance public safety by, among other things, promoting the safe transport of petroleum products over navigable waterways and facilitating pipeline monitoring efforts by patrol aircraft.

8. Multiple Address System ("MAS") assignments[8] are also used extensively in the production of oil and gas from both on-shore and offshore wells, as well as in the remote operation of pipeline facilities. For example, in addition to other purposes, MAS facilities are used to support "alarm" units to signal abnormal operation conditions, thereby indicating the need for corrective action to be taken either by remote or on-site measures. Interstate pipeline companies also have a growing need for MAS and other private wireless communications facilities to be compliant with Federal Energy Regulatory Commission ("FERC") regulations that require these companies, on the first business day of each calendar quarter, to electronically disseminate an index of all their firm transportation and storage customers under contract as of that date.[9] The amount of data, the number of data points, the frequency of measurement and the remoteness of the locations of the monitoring facilities necessary to meet the FERC requirements dictate a need for significant private wireless spectrum. As an example, more than a billion cubic feet a day of natural gas passes through some delivery points on major interstate pipeline

[8] The FCC has designated the 928/952/956 MHz bands and fifteen channel pairs in the 932/941 MHz band exclusively for public safety and private internal radio services Multiple Address Systems. See generally, Amendment of the Commission's Rules Regarding Multiple Address Systems, *Report and Order*, WT Docket No. 97-81, 15 FCC Rcd 11956 (2000).

[9] See 18 C.F.R. § 284.13(c)(1).

systems and the measurement of gas quality and volume at these delivery points occurs as often as every 10 seconds.

9. The petroleum, natural gas and energy distribution industries have increasingly relied upon MAS assignments from the 900 MHz band for the operation of SCADA systems. These systems, which involve two-way traffic requiring paired channels, allow a master station to monitor and control the status of a multitude of measurements and tolerance limits at wellheads, compressor stations and valves, thus eliminating the need for constant manual surveillance. In particular, SCADA systems are deployed in production fields and along pipelines to monitor and adjust a variety of operating parameters, such as temperature, pressure level and volume. These monitoring functions are essential to satisfy safety and environmental objectives and to maintain an acceptable level of production.

10. While current MAS spectrum allocations help address pipeline SCADA and FERC-imposed pipeline monitoring requirements, there is insufficient spectrum available to fully meet existing needs, or to satisfy emerging operational requirements. The MAS spectrum has supplied a temporary solution to the need for more private spectrum, however, it is unlikely to provide sufficient future relief from the increasing congestion in the private wireless spectrum bands.

11. Primarily because of the lack of adequate licensed spectrum, oil and gas companies also currently operate private internal communications systems utilizing frequencies on an unlicensed basis in the 902-928 MHz band, the 2.4 GHz band (2400-2483.5 MHz) and the 5.8 GHz band (5725-5850 MHz). These systems are governed by certain technical and service requirements under Part 15 of the FCC's Rules and Regulations which, among other things, require users to accept any interference that may occur from other radio systems (licensed or

unlicensed) or industrial, scientific or medical systems (including microwave ovens and microwave lighting systems). A growing problem for systems that operate in the unlicensed bands is the "raising of the noise floor." That is, as more and more unlicensed systems are deployed within close geographical proximity to one another, the systems become less and less reliable because the aggregation of transmitted energy begins to reduce each system's ability to discriminate its desired signal from the "noise." Notwithstanding the noise problem, however, such unlicensed systems are being used to provide high speed data transfer capabilities through direct sequence spread spectrum systems and lower speed data acquisition in frequency hopping, MAS-like, point-to-multipoint systems. Although unlicensed spectrum helps to meet the oil and gas industry's need for radio spectrum, the unlicensed bands cannot be relied upon to meet the system integrity and communications reliability requirements demanded by the public safety aspects of oil and gas pipeline operations.

B. Application of Spectrum-Dependent Technologies – Types of Use

The Public Safety and Protection of the Environment

12. API cannot overemphasize the important role that public safety plays in the conduct of its members' operations, both in response to emergency incidents as well as in maintaining a safe working environment during daily operations. As discussed, two-way land mobile radio capability is an essential tool used during almost every phase of the oil and gas industries. Reliable communications must be maintained during exploration activities to manage personnel and equipment. Drilling operations, by their very nature, involve potential hazards that can be minimized by the use of reliable two-way mobile radio communications. And, after production is established, mobile radio continues to play a critical role in providing communications for the management of producing wells. The safe and efficient operation of the

extensive pipeline "gathering" systems (a network of relatively small diameter pipes that aggregates wellhead production for processing and long-haul transportation) and the long-distance pipelines, used to transport crude oil, petroleum products and natural gas, would not be possible without reliable two-way mobile radio communications. The safety of refinery personnel also requires access to clear channels of communication. In short, virtually every manner in which these industries utilize two-way radio facilities has an important public safety function.

13. In addition to the day-to-day safety considerations, private communications systems are also widely used to support personnel who respond to emergency situations. For example, many port cities and coastal states have adopted public/private oil spill response plans. In light of the fact that petroleum companies have firsthand knowledge of the requisite emergency response plan, as well as the types of vessels and the number of personnel required for a cleanup operation, petroleum companies frequently are the most qualified to provide the necessary communications facilities to spill response teams.

14. Not all emergency use of private radio is confined to oil spill response. In 1994, a large fire in the San Luis Obispo Forest destroyed the Forest Service's repeater and also incapacitated the pipeline communications system of a major oil company, Chevron. Cellular phones did not provide coverage to this remote location; thus, fire-fighters and the oil company's pipeline response personnel faced the possibility of combating a raging fire without communications capabilities. Chevron responded by flying-in its oil spill response equipment, which immediately provided temporary microwave and VSAT communications to the Forest Service and to Chevron's personnel on the ground. There was no other means of communications in the deep valleys and steep mountains of the national forest; cellular

telephones maintained by the Forest Service were useless. Thanks to its private communications capabilities, Chevron was able to assist the Forest Service and quickly restore its control and monitoring of the systems along the length of the nearby oil pipeline.[10]

15. Another incident in 1994 occurred in Edison, New Jersey where a natural gas pipeline operated by Texas Eastern Gas Pipeline Company erupted into a ball of flame in the middle of the night. The explosion created a large hole in the ground where the open end of the pipe was blowing fire like a blow torch in the direction of an apartment building. Although commercial wireless communications services were available in the vicinity of the incident, they were unavailable for emergency response since the press had tied up all of the available channels. Fortunately, Texas Eastern employed a private radio system for its day-to-day operations and was able to communicate with the upstream compressor station to shut down the compressors and close the valves shutting off the gas supply. The incident was resolved with minimal damage and injury to the public because of the availability of private mobile radio communications. Further, although commercial wireless capacity is certainly greater today than it was seven years ago, it cannot be expected that commercial wireless services would be sufficient to satisfy the needs of emergency response to incidents of this nature; if the press did not tie up all the channels, it is quite possible that the local residents would.

16. It is important to keep in mind that while the emergency preparedness capabilities of these industries are vitally important, the public safety functions served by the private radio systems operated by these energy companies actually extend far beyond emergency response. As producers and transporters of materials which are highly flammable, environmentally

[10] In fact, the oil company received an official commendation from the Forest Service for its cooperation and assistance in containing the fire.

hazardous and potentially toxic, the petroleum and natural gas industries are subject to numerous laws, regulations, codes and standards that require them to utilize reliable, redundant, and secure communications. The Federal Communications Commission has stated that:

> the very nature of services such as utility, pipeline, petroleum, and railroad often involve potential hazards where reliable radio communication is an essential tool in either avoiding the occurrence of such hazards or responding to emergency circumstances. Entities providing these services utilize radio communications not only in performing their routine functions but also in coordinating with local officials and other entities in maintaining or restoring these critical services.[11]

17. These systems facilitate response to emergency incidents in addition to the critical role these systems play in protecting the safety of life, health and property *every day* by monitoring and controlling conditions that could ultimately result in an accident or other incident if left unattended.

18. Protection of the environment is also an important function of these private communications systems. Environmental accidents can occur at any time and in any location. When the *Valdez* ran aground in Alaska's Prince William Sound, the oil spill response crews needed instant communications on a massive scale. There were inadequate commercial communications facilities, and only a few VHF public coast stations in the area. Exxon's private mobile radio capability, however, solved the problem; Exxon employed over 6,000 portable radios and provided coverage to workers over a 50,000 square mile area. Those workers used the radios for tasks such as boom deployment, wildlife rescue, flight following, medical evacuations, inter-ship communications, coordination of beach cleanup crews, monitoring the

[11] The Development of Operational, Technical and Spectrum Requirements For Meeting Federal, State and Local Public Safety Communication Requirements Through the Year 2010, *Notice of Proposed Rulemaking*, WT Docket No. 96-86 (rel. 1996) ¶ 25.

weather, tracking the direction of the current, and generally ensuring the safe and efficient operation of the cleanup. Because of the remote location, the need for a quick response and the enormity of the project, commercial providers could not even begin to serve Exxon's needs for mobile radio communications. Instead, Exxon requested and received Special Temporary Authority from the Federal Communications Commission to utilize over 200 frequency assignments in Prince William Sound.

19. While the Valdez oil spill is a leading example, spills also have occurred on much lower levels in many different locations around the country. Often, the difference between environmental threat and environmental catastrophe is the amount of time given to response crews and the degree of communication and coordination that exists between these workers. The sooner oil booms are in the water and other spill containment activities are commenced, the greater the chances that the impact of spills on marine life and waterfowl will be minimized. The same is true for spills that occur on land; again, a fast response and radio-coordinated containment effort is key to minimizing environmental damage.

20. Effective private communications are the cornerstone to protecting the environment in any spill response operation. Many spills occur in remote areas of the sea or land, usually without forewarning and without commercially available communications services. To protect the environment, private users depend on special radio-equipped trailers or other containers that can be airlifted to the spill site. These facilities are employable for instantaneous communications and are often capable of coordination between different types of users. Thus, a search boat can communicate with onshore facilities, aircraft and with other offshore containment vessels.

21. The location of a disaster cannot be predicted. Waterway disasters can occur anywhere, for example, from the Houston Ship Channel, to New York Harbor, to the coast of Alaska. Land borne disasters also do not discriminate as to location. For example, incidents have occurred where: miles of pipeline spontaneously exploded; large petroleum tank farms became enveloped in flame; and railroad tank cars containing hazardous chemical materials derailed causing the evacuation of entire communities. Commercial providers do not even offer service in many remote areas where oil and gas companies operate production facilities, pipelines and marine vessels.

22. In the case of oil or chemical spills, it is vital to the success of the cleanup operation that response crews have early access to trunked channels, especially if the spill occurs in an ocean, lake or other waterway. The necessity to utilize a number of working crews, both on shore and aboard marine vessels, and to coordinate these activities from the air, requires that several mobile communications systems be employed in a single containment and cleanup project, and that most channels be trunked for maximum efficiency. In API's view, PLMRS communications provide the best solution for spill response, containment and cleanup operations.

Conducting Exploration Activities

23. Two-way communications capabilities are important tools that must be maintained during exploration activities to relay commands to workers and manage equipment. Exploration activities typically take place in remote areas of the United States; for example: the Badlands of the Dakotas, the deserts of the Southwest, and the waters of offshore California and the Gulf of Mexico. Personnel are sent into these inhospitable locations to search for new sources of energy. PLMRS systems are vital to the safety of these workers, providing an

essential communications link to rescue personnel in the event that a life-threatening emergency situation should arise. These personnel also utilize PLMRS systems extensively in order to establish and maintain contact with supply sources and to conduct their exploratory activities. These energy industries also utilize PLMRS facilities for exploration in the Rocky Mountains. These systems enable exploration crews to communicate from remote areas with rugged terrain where commercial operators do not provide service.

24. A unique and important application of PLMRS equipment is to control and synchronize multiple geophysical acoustical signal systems, which are essential tools used for oil and gas exploration. These signal systems operate by precisely timing the echoes from the detonation of explosives or other signal sources. PLMRS is sometimes used to instantaneously feed the data collected at numerous points on the earth's surface to a computer(s) which collects that data and compiles it into a portrait of the underground rock structure. Using this technique, oil and gas companies can identify areas of petroleum or natural gas deposits. Without PLMRS, however, the precise coordination of data from multiple points would not be possible and the exploration activities would be significantly more difficult and costly.

Drilling Operations

25. Drilling operations, by their very nature, involve hazards that can be minimized with reliable two-way mobile radio communications. Drill rig personnel work with huge, rotary machinery, lifting miles of steel tubing and scale derricks that are several stories in height. These drilling crews must communicate with personnel both nearby and far from the drill site. Drilling operations, however, often occur in remote areas, such as the Rocky Mountains, offshore and in Alaska, where reliable commercial service may be unavailable. Further, as indicated previously, even if commercial service were available, the potential for service

blockage would be unacceptable for critical operations. Therefore, private communications capabilities are crucial for the safe execution of these operations.

26. In addition, workers in the drilling fields typically operate both portable and mobile PLMRS radios. These radios allow an individual to place a distress call, accelerate the dispatch of a vehicle to meet the rescue squad, and lead the rescue personnel back to the isolated location. Two-way radios also provide a party line to coordinate rescue operations among multiple crews operating on the same channel. Cellular and other commercial services are normally one-to-one communications and thus do not provide the same capabilities for the emergency search and rescue of injured personnel. By using PLMRS, workers can contact rescue personnel and synchronize rescue operations, which is especially vital in harsh terrain and remote locations.

Production Activities

27. After drilling is established, mobile radios play a critical role in providing communications for the management of production sites[12] where careful supervision must be maintained over the operation of valves, pumps, compressors and separation equipment. Timing is essential in this phase of operations. For example, production plant operators must be able to immediately turn off remote valves – the immediacy with which this command must be carried out is so critical that there is insufficient time to dial a commercial system and then transmit a command to turn off a valve. PLMRS radios solve this problem by providing plant operators with real-time communications capability and the ability to communicate with numerous parties simultaneously.

[12] The oil and gas industries also utilize the low power offset frequencies on the PLMRS bands for telemetering applications associated with production activities.

Pipeline Transportation

28. Today there are almost 170,000 miles of petroleum pipelines running throughout the United States, carrying both the crude oil and refined products that provide Americans with the 700 millions gallons of oil products used every day.[13] In addition to products pipelines, there are nearly a million miles of natural gas pipelines in the United States carrying natural gas from production fields (including the Texas/Oklahoma "panhandle" region, the Texas/Louisiana gulf coast and the Gulf of Mexico as far as 100 miles, or more, off shore) to industry, commercial and residential customers throughout the United States. The safe and efficient operation of the extensive pipeline gathering systems and management of the long-distance products and natural gas pipelines would not be possible without reliable two-way mobile radio communications. Commercial networks are not available in many places where pipelines operate, and even where available, the commercial networks may not provide the required performance levels and can quickly become overloaded in emergency situations.

29. PLMRS spectrum is heavily used in products pipeline operations and maintenance activities. Sophisticated supervisory control and data acquisition ("SCADA") systems allow companies to safely monitor and control pipeline facilities. Pumping facilities that produce thousands of horsepower of energy and metering facilities that measure thousands of barrels per hour are routinely operated remotely via these SCADA systems. They can be properly operated only by using extremely reliable communications systems. Radio systems in the PLMRS band are an integral part of the SCADA system. Also, many pipeline facilities still require manual operation. In order for this manual operation to be coordinated with the rest of the pipeline system, extremely reliable communications capabilities are required. Pipeline maintenance

[13] See API, *Pipelines: America's Lifelines* (last modified Dec. 6, 2000) <http://www.api.org/industry/pipelines/pbasic.htm>.

activities are also coordinated using private radio systems; for example, the pipeline control center must be in constant contact with maintenance crews located in remote areas to ensure the protection of these workers and the environment.

30. Natural gas consumption in the United States exceeds 20 trillion cubic feet per year, and most of the gas is delivered via pipeline. Interstate pipelines have been used to transport natural gas from the production fields to the consumption markets for more than 70 years. Vast networks of pipelines connect production/processing plants with markets utilizing pipes as large as 42 inches in diameter and pipeline pressures exceeding 1,000 pounds per square inch. Generally, due to pressure drops along the pipeline, natural gas is recompressed approximately every 90 miles by compressor facilities. Further, because of safety considerations, pipeline rights-of-way and compressor stations are generally located in remote locations away from populated areas.

31. The DOT Office of Pipeline Safety ("OPS") reported that, in 1999, there were almost 321,000 miles onshore and 12,000 miles offshore of natural gas transmission and gathering systems in the United States, with an estimated distribution service mileage of over 640,000 miles.[14] To underscore the importance of the communications and monitoring systems used to support these pipelines, an OPS Pipeline Safety Advisory Bulletin stated that OPS inspectors had "identified inadequate SCADA performance as an operational safety concern."[15] Accordingly, the Bulletin advises pipeline system owners and operators that "[e]ach pipeline operator should review the capacity of its SCADA system to ensure that the system has resources

[14] See Office of Pipeline Safety, U.S. Department of Transportation, *Natural Gas Transmission Pipeline Annual Mileage* (last modified Mar. 13, 2001) <http://ops.dot.gov/stats/gtannual.htm>.

[15] U.S. Dept. of Transportation, Office of Pipeline Safety, PIPELINE ADVISORY BULLETIN, ADB-99-03 (July 1999).

to accommodate normal and abnormal operations on its pipeline system."[16] OPS notes that inadequately functioning SCADA systems dangerously restrict the pipeline operators ability to see and react to abnormal developments in pipeline operation.

Refinery Operations

32. Petroleum, the single largest source of energy in the United States, requires refining processes to convert crude oil into the numerous products utilized by consumers.[17] As of January 1, 2000, there were over 150 refineries operating in the United States, with a production capacity of over 16 million barrels per day.[18] Constant PLMRS communications are absolutely necessary in petroleum refineries where the safety of personnel requires clear channels of communication. In the refinery environment, personnel are required to perform demanding tasks - which involve highly toxic, volatile petrochemicals and related pressurized substances – to manage the production process as crude oil is transformed into hundreds of products.[19] Refinery personnel employ portable units for operational communications within the individual processing units. These workers also utilize PLMRS systems to provide refinery-wide communications capabilities to coordinate emergency response, help ensure the safety of refinery employees, and support maintenance activities throughout the plant.

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[16] Id.

[17] See API, *Refining: Basic Facts* (last modified Apr. 26, 2001) <http://www.api.org/industry/refining/rbasic.htm>.

[18] See id. API, *Refining: Basic Facts* (last modified Apr. 26, 2001) <http://www.api.org/industry/refining/rbasic.htm>.

[19] The petrochemicals and products produced from crude oil include: gasoline, distillate fuel oil, kerosene-type jet fuel, residual fuel oil (heavy oils used as fuel in industry, marine transportation and for electric power generation), liquefied refinery gasses, still gas, asphalt and road oil, petrochemical feedstocks, lubricants, kerosene, and others.

33. A typical large refinery runs 365 days a year, 24-hours a day, and employs between 1,000 and 2,000 workers. Refinery-based PLMRS communications capabilities are essential to provide the monitoring and data transfer capacity that is critical to the safe operation of the refinery. Refinery-based PLMRS systems are the epitome of the traditional trunked communications system, designed to provide dispatch service to a single, well-defined locale. They are used for internal communications to support day-to-day operations, including the dissemination of critical instructions and the dispatch of personnel, equipment and supplies required for the safe operation of the refinery. These communications systems are frequently loaded with several hundred (and sometimes thousands) of portable and vehicular transceivers.

34. Refinery personnel utilize these facilities in dozens of talk groups to facilitate communications among fellow workers charged with the operation of numerous refining processes within a single refining area or plant. For example, ExxonMobil operates two large refineries, one in Baytown, Texas, and another in Baton Rouge, Louisiana. To manage operations in these refineries, the personnel in each of these facilities utilize over 3,000 radios authorized in the PLMRS. These radios allow personnel to talk with others located throughout this considerable refinery complex. These same private radios are used to assist with the performance of maintenance functions and for safety and security operations. Many refineries also operate their own internal rail lines for the intra-plant transportation of crude and refined petroleum products. Without PLMRS, these rail lines would be difficult or impossible to operate in a safe and efficient manner.

Distribution

35. Private mobile radio continues to play an important role in the transfer of the finished products of the petroleum and natural gas industries. In the course of petroleum

distribution, PLMRS systems are employed during the loading and unloading at marine terminals, as well as with the delivery of refined petroleum products to industrial, commercial and residential customers by rail and tank trunks. Likewise, for natural gas distribution, PLMRS systems are routinely used at city gates and other locations to facilitate the provision of natural gas to end-users. Again, as with other industry activities such as exploration or refining, commercial services are often not able to provide the communications capabilities required. For example, in the Los Angeles suburb of Huntington Beach, California, an oil spill occurred in 1990 when an anchor accidentally hit a tanker loaded with crude oil. In light of the proximity of the spill to a major urban center, PLMRS facilities were indispensable to the timely reaction and containment of the spill.

C. Commercial Services Alone Are Inadequate

36. Oil and gas companies require the use of private communications systems for a variety of reasons. Many times no commercial service is available. If commercial services are available, they are often inadequate to meet the specialized and critical needs of the petroleum and natural gas industries. In a staff White Paper, the FCC's Wireless Telecommunications Bureau summarized the numerous reasons why these companies, as well as other private wireless licensees, require private, internally-controlled communications capabilities: 1) immediacy; 2) control; 3) capacity/usage; 4) reliability; 5) coverage/availability; 6) priority access; 7) equipment requirements; and 8) liability.[20] For example, commercial services are not liable for non-compliance with safety regulations and other laws. Department of Transportation ("DOT") regulations and policy governing the transport of hazardous materials require pipeline operators

[20] See generally, Federal Communications Commission Wireless Telecommunications Bureau, *Staff White Paper* (rel. Dec. 19, 1996) (discussing the spectrum requirements of and uses by the private land mobile community).

to maintain and manage reliable and secure primary and secondary communications systems.[21] Senior DOT officials have interpreted this requirement to mean that oil pipeline operators cannot rely on the commercial switched network for primary communications and commercial cellular service for secondary communications; in other words: commercial communications service alone does not comply with DOT requirements for the safe transmission of oil and natural gas. Likewise, not all commercial providers offer the "intrinsically safe" (i.e., explosion-proof) equipment that is required under the Occupational Safety & Health Act[22] to be used in potentially hazardous environments such as oil refineries; manufacturers of private systems, by contrast, are familiar with these requirements and design equipment that meets all applicable safety standards.

37. It can be especially dangerous if these industries are forced to rely on commercial services because often, in emergency situations, commercial services become flooded and congested – in the situations when coordination and communications among workers and rescue personnel is the most critical. If the common carrier providing telecommunications service is unable to restore service, there is no guarantee as to when service can be repaired. Furthermore, because commercial providers often prioritize highly populated, customer intensive areas over rural and industrial sectors, the areas in which the energy companies' facilities are located are the last to have service restored. Petroleum and natural gas providers have a very low tolerance for communications disruptions and must have service restored *as quickly as practical*; therefore, private users must maintain their own system capabilities for use in situations where primary commercial systems fail. For critical public safety reasons, oil and gas companies cannot risk

[21] See generally, 49 C.F.R. § 194.107(d)(1)(ii); 49 C.F.R. § 194, App. A; 49 C.F.R. § 195.401(a); 49 C.F.R. § 195.408.

[22] See e.g., Occupational Safety & Health Act, 29 U.S.C. § 655 (1970).

service disruption when operating a pipeline; drilling a well; running a refinery; loading and unloading ships with oil and refined products; and performing the other numerous tasks which mandate reliable and constant communications capabilities.

38. These energy companies often cannot rely on commercial providers because of the unique needs of their industries and the fact that these providers are not always responsive to the changing business needs of these companies. For example, many commercial providers do not supply service in many of the remote geographical locations where petroleum and natural gas collection, transportation, distribution, and refining take place. For this reason, along with the operational concerns where commercial services are available, private systems are essential in areas where telecommunications facilities are inadequate or non-existent, such as rural and low-population density environments.

39. API believes that commercial providers can be useful in certain circumstances and recognizes that commercial service can be an important component of public safety communications systems. However, it is critical to emphasize that private users need the ability to choose a combination of private and commercial services to meet their own particularly unique safety needs. Private users will continue to require PLMRS and other private systems to meet the vital public safety concerns that face these industries.

D. Non-Spectrum Dependent Technology or Commercial Services Currently Utilized (e.g., wireline, Internet)

40. The oil and gas industry is a "heavy" user of non-spectrum dependent technologies including fiber-optic and "copper" wireline networks, as well as commercial wireless services. Although a significant portion of petroleum industry operations hinges on the "mobility and/or remote location" aspect of production, transportation and distribution, there are

administrative and operational centers that closely resemble other industries in terms of communications needs. For example, once operational data is gathered from remote locations, the "processed" data is made available to field offices and other locations via private or commercial wireline networks, including fiber optic data networks. Also, many petroleum energy companies have international office locations which employ commercial networks to provide switched voice and data services, including intranet and Internet services.

41. In terms of commercial wireless services, the oil and gas industry recognizes the general ubiquity of such services and the cost-benefit of such services for non-mission critical communications. As future applications, such as wireless Internet access, are deployed by commercial operators, it is anticipated that the petroleum industry will be users of the technologies. However, as previously explained, it is not anticipated that commercial wireless services will totally replace the need for private wireless facilities.

42. In addition to the use of commercial wireless and common carrier networks, some pipeline companies have deployed private fiber optic networks along their rights-of-way. However, with some notable exceptions, most pipeline companies have been reluctant to deploy fiber optic networks because of operational concerns. The principle concern with such deployment is twofold: operating and maintaining fiber networks could interfere with "core business" pipeline operations; and, communications may be lost at the most inopportune time, such as when a high-pressure pipe bursts and destroys the fiber optic cable at the same time.

III. FUTURE / PROJECTED USE

43. It is anticipated that there will be an increased need for spectrum allocations to support systems utilized by the oil and natural gas industries. This expectation is based on

petroleum and natural gas production and consumption forecasts through the year 2020. Crude oil and natural gas liquids production is expected to increase, forecasted to potentially reach up to 8.5 million barrels per day in 2010 and 8.67 million barrels per day in 2020.[23] It is expected that the total petroleum demand in the United States will be as high as 23.86 million barrels per day in 2010, and as high as 27.11 million barrels per day by 2020.[24] It is also anticipated that natural gas consumption will be as high as 32.78 trillion cubic feet in 2015 and 36.09 cubic feet in 2020.[25] This increased production and consumption will require additional communications capabilities to sustain all stages of the exploration, production and distribution process.

A. Future Technology and Commercial Services

Data systems

44. Fixed wireless data systems have been an integral part of the oil and gas industry's communications networks almost as long as wireless data technology has been available. In addition to SCADA systems and remote meter reading, fixed wireless systems have supported wide area data networks such as client-server networks and remote access of host mainframe computers. Although most companies employ private networks to support mission-critical data systems, some uses have been found for commercial wireless data networks, such as CDPD. Further, as the need for worker mobility continues to evolve, many companies will undoubtedly incorporate mobile data systems into their networks, whether supported by

[23] See Department of Energy, Energy Outlook 2001, Table 27. *Comparison of petroleum forecasts*, (last modified Jan. 30, 2001) http://www.eia.doe.gov/oiaf/aeo/tb127.html.

[24] These figures include petroleum products such as motor gasoline, jet fuel, distillate fuel and residual fuel. See Department of Energy, Annual Energy Outlook 2001, Table 27. *Comparison of Petroleum Forecasts*, (last modified Jan. 30, 2001) http://www.eia.doe.gov/oiaf/aeo/tbl27.html.

[25] These natural gas consumption forecasts include use by residential, commercial, and industrial consumers, as well as fuel consumed by electricity generators and natural gas vehicles. See Department of Energy, Annual Energy Outlook 2001, Table 26. *Comparison of Natural Gas Forecasts*, (last modified Jan. 30, 2001) http://www.eia.doe.gov/oiaf/aeo/tbl26.html>.

commercial or private systems. As with fixed wireless networks, however, system reliability considerations will favor private networks for mission-critical mobile wireless systems.

Digital systems

45. Since the oil and gas industry has been such a long-term user of radio spectrum, many of the systems in service utilize analog modulation. This is particularly characteristic of land mobile radio networks, but not as characteristic of point-to-point microwave or multiple address systems, which generally have been upgraded to digital modulation. For a number of reasons, including spectral efficiency, future wireless networks (both fixed and mobile) will certainly employ digital modulation. However, the migration to digital modulation will parallel emerging operational needs based on core-business efficiency requirements. A principal reason that analog systems are still the predominate mobile radio technology is that analog modulation continues to satisfy many current operational requirements. Further, as a result of corporate reorganizations, many companies have surplus mobile radio equipment that can be used to support the mobile radio needs for quite some time. Moreover, corporate managers are generally reluctant to approve capital funding for projects that are not required to meet safety requirements, operational needs, or regulatory mandates. Another obstacle to the oil and gas industry's adoption of digital technology for mobile radio systems is that most systems are integrated into relatively large networks and system upgrades need to be "all or none." This is also complicated by the fact that imbedded analog systems generally still have a long useful life and system upgrades would abandon useful equipment.

46. In addition to the business considerations for continuing to use analog technology, it should be noted that digital modulation requires greater interference protection than analog modulation in order to achieve the same reliability. That is, even though digital modulation may

provide a greater data throughput capacity than analog modulation for the same amount of spectrum used, the ability of digital systems to discriminate wanted signals from unwanted signals is less than that for analog systems. Thus, to achieve the same system coverage and reliability (along a pipeline right-of-way, for example), it would require the construction of an increased number of base stations, more closely-spaced together, than is currently required for analog technology.

B. Recommendations

Separate Pool for Certain "Public Safety" or Critical Infrastructure Industries

47. In the Balanced Budget Act of 1997, Congress directed the FCC to use competitive bidding to resolve mutually exclusive initial applications for licenses; the auction requirement, however, does not apply to "public safety radio services."[26] The FCC has interpreted this to mean that spectrum will be exempt from auction under this statutory exception only if the dominant use of the spectrum is by auction-exempt entities that "(1) have infrastructure that they use primarily for the purpose of providing essential public services to the public at large; and (2) need, as apart of their regular mission, reliable and available communications in order to prevent or respond to a disaster or crisis affecting the public at large."[27] As the FCC noted, Congress has specifically identified the CII entities as those industries that should be included in the "public safety radio services" because of their critical public safety functions.[28]

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[26] See 47 C.F.R. §§ 309(j)(1) and (2).

[27] See Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended, WT Docket No. 99-87, *Report and Order and Further Notice of Proposed Rulemaking* (FCC 00-403) ¶ 77 (2000).

[28] See H.R. Conf. Rep. No. 105-217, 105th Cong., 1st Sess., at 572.

48. It is important to note that, in applying this exemption, the FCC will consider the dominant use of the spectrum band, not the individual licensee. The service categories of spectrum heavily utilized by these energy industries were not included in this exemption.[29] API and the other CII entities have asserted that, in light of the critical safety functions of the radio systems utilized by their members, these private licensees need some additional protection and assurance that there will be spectrum available to operate the systems that support their vital public safety needs. Accordingly, API, alone and in conjunction with the other CII entities, proposed the creation of a separate frequency pool for auction-exempt "public safety radio services" in the various private radio bands. Especially where there is a potential that mutual exclusivity could occur in spectrum bands not considered to be "dominantly" used for public safety services, the creation of a separate pool would allow spectrum to be set aside for auction-exempt entities in a manner proportionate to their level of existing or foreseeable use in every private radio band.

49. As it stands, the "all or nothing" approach of the auction exemption significantly limits the amount of spectrum available to the oil and gas industries, and the critical infrastructure industries as a whole, for use to provide the necessary day-to-day communications capabilities required by these companies and utilities. Furthermore, the auction exemption for the "public safety radio services" will do little to ease the spectrum shortage facing energy companies and other providers unless the FCC is able to make both new and existing spectrum bands available to the CII entities. By using the FCC's current approach, it is possible that not a single frequency band or portion thereof would be set aside for "public safety radio services" –

[29] The FCC concluded that the Industrial/Land Transportation Radio Service and Business Radio Service categories in the 800 MHz and 900 MHz bands, as well as the PLMRS frequencies in the 470-512 MHz band should not be included in the public safety services exemption. Id. at ¶ 81.

which could have potentially devastating consequences to human life, health and the natural environment. Therefore, a more rational and equitable approach to implementing the "separate pool" might be to allocate a *proportionate* number of channels or frequencies to "public safety radio services" in the existing bands relied upon by auction-exempt entities and in every new spectrum band for which it is determined that they have a need.

50. Despite the fact that, in the past, the FCC has rejected proposals to create a separate frequency pool for public safety services, this does not change the factual realities that face the oil and gas industries. Congress has recognized that the private internal radio services used by oil and gas companies are important to the safety of life, health and property. Due to the consolidation of the formerly exclusive Petroleum, Power and Railroad services into the broad Industrial/Business category, there is no guarantee that frequencies will be available for use by these critical infrastructure industries if all available channels in a particular band are being utilized by other industrial users. Consequently, it is anticipated that there will be a growing number of cases where CII entities will be denied use of the reliable communications capabilities they require to discharge their obligations in a satisfactorily safe and efficient manner. It should also be underscored that commercial services are not an adequate substitute for the private, internal facilities operated by these energy industries, and it is essential that they have the capabilities to operate their vitally important communications systems.

<u>Develop protection criteria that protects existing CII / 25 kHz systems</u>

51. Part of the impetus behind the proposal to create a separate frequency pool for the CII entities is the fact that these licensees, because of the public safety aspect of their operations, should be afforded greater interference protection from other users than is currently available. Currently, applicants for channels in the former Power, Petroleum and Railroad Radio Services

must submit requests to operate on these frequencies to a frequency coordinator to ensure that use of these channels does not cause harmful interference to neighboring licensees. Despite frequency coordination requirements, however, instances of harmful interference are increasingly reported to be causing significant harm to the operations of CII licensees.

52. As previously indicated, the net result of the FCC's refarming effort has been to reduce the reliability of incumbent 25 kHz systems. Since the PLMRS bands are allocated for "shared" use, no licensee is afforded "exclusive channels" or "protected service areas." To make matters worse, new licensees are now permitted to operate on 12.5 kHz channels that spectrally overlap the former 25 kHz channels. Further, for coordination purposes, these channels are currently considered to be "adjacent" to the 25 kHz channels and are being licensed in close geographical proximity to incumbent 25 kHz systems. However, because of the frequency overlap of the "old" and "new" channels, the new channels should either be considered co-channel with the old channels, or a "small" derating factor should be applied to the adjacent channel for coordination purposes.

53. In the 5th Memorandum Opinion and Order in its Spectrum Refarming Proceeding, the FCC requests that the land mobile industry reach consensus on the appropriate adjacent channel coordination criteria.[30] The impact of the current licensing regime is that new "adjacent channel" licensees are causing interference into incumbent CII systems. Moreover, in industry discussions to achieve consensus regarding adjacent channel coordination criteria, "non-CII frequency coordinators" have suggested a rather large derating factor be applied to the

[30] See Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing Them and Examination of Exclusivity and Frequency Assignment Policies of the Private Land Mobile Services, PR Docket No. 92-235, *Fifth Memorandum Opinion and Order*, 61 Fed. Reg. 8899 (2001) (*Fifth MO&O*).

adjacent channel. Derating the adjacent channel too much would promulgate the increasing interference from new adjacent channel licensees. In that regard, in industry discussions, some frequency coordinators have indicated that some interference into incumbent 25 kHz systems may provide the incentive for them to replace their systems and migrate to 12.5 kHz channels. The oil and gas industry is not opposed to migrating to narrowband channels, but does not consider interference into public safety related systems to be the proper incentive to move.

IV. CONCLUSION

54. A few years ago, the National Telecommunications and Information Administration documented the important spectrum needs and dangerous deficiencies facing the PLMRS community, indicating that they need more, not less, spectrum.[31] This situation has not changed. The oil and gas industries are, and will continue to be, significant users of private radio systems. Private systems are essential in the daily operations of these energy industries. These capabilities are also vital to the effectiveness and speed of responses to emergency incidents. Moreover, private systems will continue to be needed in areas where there are inadequate or no public telecommunications facilities.

55. Even though the use of private, internal systems may be supplemented with commercial services - where those services are available and useful - there remains a very critical need for privately-owned, managed and operated radio systems in the petroleum and natural gas industries. The petroleum and natural gas industries welcome the opportunity to

[31] See generally *U.S. National Spectrum Requirements: Projections and Trends*, U.S. Department of Commerce, National Telecommunications and Information Administration (April 1995).

continue to develop and employ the systems that enable them to have the private internal communications capabilities that are so vital to the safe operation of these energy industries.

Respectfully submitted,

THE AMERICAN PETROLEUM INSTITUTE

By: Wayne V. Black
Katherine C. Lucas
Its Attorneys
and
Randall D. Young
Telecommunications Engineer

Keller and Heckman LLP
1001 G Street, N.W. Suite 500W
Washington, DC 20001
(202) 434-4100

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