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DEPT. OF TRANSPORTATION
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U.S. Department of Transportation
400 Seventh Street, SW
Washington, D.C. 20590-0001

Re: Docket No. RSPA-99-6283 (HM-230) - 23

American Petroleum Institute comments on Proposed Rule "Hazardous Materials Regulations: Compatibility With the Regulations of the International Atomic Energy Agency" - (request for comments published 64 FR 72633 December 28, 1999) Docket No. RSPA-99-6283 (HM-230)

Dear Ladies and Gentlemen:

The American Petroleum Institute (API) appreciates the opportunity to comment on the proposed revisions to the Hazardous Materials Regulations (HMR) pertaining to the transportation of radioactive materials. API's more than 500 members are involved in all facets of the petroleum industry including exploration and production, transportation, refining and marketing. Transportation of Naturally Occurring Radioactive Material (NORM) waste occurs as a result of the production of oil and natural gas. As such, API has a direct interest in this proposal and in the success of the Research and Special Programs Administration of the Department of Transportation (DOT) in improving regulation of these materials as it pertains to the oil and natural gas industry.

On December 28, 1999 DOT published in the Federal Register an advance notice of proposed rulemaking (ANPRM) under (64 FR 72633). This ANPRM indicates that DOT is considering the possible adoption in Title 49 of the Code of Federal Regulations of some or all of the 1996 changes to the international regulations governing the safe transport of radioactive material, as contained in the International Atomic Energy Agency (IAEA) publication entitled "IAEA Safety Standards Series: Regulations for the Safe Transport of Radioactive Material", 1996 Edition, Requirements, No. ST-1.

Summary

API's comments include a brief description of current shipping and handling practices of NORM in the oil and natural gas industry and focus on several areas of concern, including the lack of a cost-benefit analysis for these proposed rules. First, the proposed re-definition of radioactive material as it pertains to hazardous shipments is unjustified and provides no public health benefit over the demonstrated safety of the current rule. Second, the proposed rule regarding mixtures of radionuclides must give full effect to the exemption permitted under Section 107(e) and the lower A2 values for some radionuclides are also not justified. Third, the comments address several impacts on shipping and radioactive disposal sites and how the proposed rules preempt existing state NORM regulations. Finally, API also proposes an alternative (gamma

measurement) that could enhance safety without imposing an unreasonable burden on the regulated community and summarizes an overall impact in public perception.

Shipping and Handling Practices of NORM in the Oil and Natural Gas Industry

The production of oil and natural gas is occasionally accompanied by the deposition of naturally occurring radionuclides (predominantly radium 226 and radium 228 and/or progeny) in scales, sludges, tank bottoms, equipment and other materials. This naturally occurring radioactive material occurs at various concentrations, varying from only slightly in excess of the concentrations found in natural rock formations to levels one hundred to one thousand times these values. A very small portion contains concentrations of these radionuclides of as much as 1000 times the threshold of being termed radioactive under the current definition of radioactive material.

Typical field operations involve moving material about for maintenance, clean up and disposal. NORM will be included in equipment (which is often shipped as Surface Contaminated Objects - SCO and/or as Limited Quantity items if it meets the appropriate criteria) or as drums or other containers of solid wastes such as soil, scales and sludges. Under current regulations, these may be shipped as Limited Quantity, LSA-I or as unregulated material. Very rarely material may require shipment as LSA-II.

Petroleum industry shipments of NORM impacted material consist of either contaminated equipment (most frequently steel piping) or soil which has small amounts of NORM mixed with it in the course of routine operations. Much of what is shipped currently falls below the DOT definition of radioactive material and is too low in concentration to meet state definitions of radioactive material as well. Thus it is shipped as ordinary solids and requires no special handling for disposal. Most of the material has concentration and isotopes similar to (or less than) uranium or thorium ores, but without the uranium and thorium-232, and is usually chemically less available than the uranium progeny in ores.

The current Radioactive Material Definition threshold of 2000 picoCuries per gram (all nuclides) has been in effect for many years and has worked well to protect the public health. There has been no finding that this standard fails to adequately protect the public, so there appears to be no benefit from making the threshold more stringent. However, it will certainly have a significant detrimental impact upon our operations.

API Objects to the Redefinition of "Radioactive Material"

There are many new proposed changes from current regulations, most minor or inconsequential, however a few are dramatic and will significantly affect the petroleum industry. The proposed rules include a re-definition of radioactive material, which is one of the characteristics used to define Hazardous Shipments. The current classification threshold of 2000 picoCuries per gram provides satisfactory protection of the US public health. No justification or rationale is presented in the proposed rule that explains the need to change the existing definition other than to update the rule and make it equivalent to the IAEA Safety Standard Series regulations.

The IAEA did not adequately address the impact of their regulations on the transport of materials in the United States. Thus, these comments highlight impacts to the petroleum industry and we believe other industries may be similarly impacted. In addition, instead of clarifying and simplifying an already overly complex set of rules and regulations, the proposed changes would needlessly increase their complexity.

As our comments outline, the current rules have adequately demonstrated the safe transport of properly classified radioactive materials. The DOT should demonstrate through the use of cost benefit analysis that the proposed change is justified. Given the significant adverse impact to the petroleum and other industries, the increased complexity of the requirements and the minimal public health benefit, the changes proposed in the ANPRM are not justified.

Demonstrated Safety of the Existing Rule

DOT's Hazardous Materials Regulations have used as the basic threshold for radioactive materials any material having a specific activity greater than 70 Bq per gram (2000 picoCuries per gram). For shipments of materials from the natural gas industry containing NORM, this definition has provided a means that allows the petroleum industry to safely ship materials such as used pipe and vessels and wastes.

Measurement methods have been established that allow the industry to comply with the applicable regulations, yet not cause undue public concern due to over classifying shipments. In addition, the definition made it possible for DOT to implement practical methods to enforce the applicable regulations and insure the public that shipments were being handled safely. In fact, API recommends the agency broaden its efforts in this area to include the use of external gamma flux measurements to determine shipping classification, therefore simplifying an overly complex set of rules and assisting the regulated community in compliance.

Proposed changes to the definition of radioactive materials will dramatically impact how the oil and natural gas industry's shipments containing NORM are classified, placing much stricter requirements upon them without evident justification for this action. In addition, the proposed changes will require a significant increased effort for the industry to ensure compliance with the applicable regulations and will require the same increased effort on the part of the DOT to enforce the applicable regulations. There is no decreased health risk or other benefit stated to increase the stringency of regulation for industry shipments containing NORM.

The Proposed Rule Regarding "Mixtures of Radionuclides" Must Give Full Effect to the Exemption under Section 107(e)

ST-1 Rule 406 and Table II apply to "mixtures of radionuclides for which relevant data are not available". As the DOT considers API's comments it should be recognized that an important interpretation has been made about how the rule will be applied. Because the isotopes potentially present in petroleum industry shipments are known, API has assumed the mixture rule's default value of 0.1 Bq/gm (2.7 pCi/gm) for "unknown" alpha emitters will not apply to these materials. Indeed, it is common to have ordinary soil exceed the 0.1 Bq/gm (2.7 pCi/gm) level of total radioactivity. It is our expectation that DOT does not intend to treat an unidentified

substance (which just happens to be ordinary soil) containing a level of 0.2 Bq/gm naturally occurring (but technically unknown) radionuclides, as a radioactive shipment. If that criterion is applied, under the strictest interpretation of the ST-1 Rules, virtually all shipments of soil, brick and many building stones become shipments of hazardous "radioactive" materials were they not otherwise shown to be exempt. If such an interpretation is incorrect, then the assessment of the impacts to the petroleum industry has been severely underestimated and the concerns would be much greater than described in these comments.

The exemption under section 107 (e) permits the transportation of bulk materials such as granite gravel, soil, zircon sands, concrete, and mineral ores that would otherwise be classified as regulated radioactive material because of their NORM component. Otherwise, per the strict interpretation of the ST1 standards described above, a radioactive placard and shipping papers would be required for many of these benign activities. However, this exemption cannot be granted using the logic that these materials do not meet the definition of "radioactive material" under the proposed rule, as almost all of these materials contain all the isotopes of the uranium decay chain. In all cases the true concentration of the isotopes in them is unknown. Many (depending on their source) will exceed the default value of 0.1 Bq/gm of total activity and would meet the criteria of "radioactive material". This exemption is based on the recognition that the simple transport of all of these materials does not present a transportation risk because of their radioactive content. It also acknowledges that the nature of their contained radioactivity exist in a different form than is common to most materials processed or used for their radionuclide content. The exemption however does recognize that some of these materials may occasionally have enough activity that potential exposures from transportation risk should be controlled. The exemption states that for these materials this occurs when the activity exceeds ten times the values specified in paragraphs 401-406.

For Table II, this means the exemption level would be set at either 1) 10 Bq/gm beta/gamma and 1Bq/gm alpha only, or 2) 1Bq/gm where no relevant data exist. Since almost all of these materials contain both alpha and beta/gamma emitters it is unclear what the correct exemption level is for most of these materials. DOT should clarify the intent of this exemption. Interestingly, if the 10 Bq/gm (270 pCi/gm) value were to be used it would roughly correspond to the old definition (under the mixture rule) of "radioactive material" as defined in the existing rules for oil field NORM and some other bulk materials. The total activity limit of 70 Bq/gm (2000 pCi/gm) is reached when the radium 226 and 228 activity in NORM is about 10 Bq/gm, assuming typical radium 226 and 228 ratio and accounting for all the daughter activity.

API recommends that the 10 Bq/gm limit be used for oilfield NORM materials in the event that the proposed definition of "radioactive material" is adopted in the final rule. This would minimize the unintended adverse impacts of the rule to all entities subject to the rule.

Lower A2 values for some radionuclides, such as Thorium 228, in NORM are not justified

Lowering the A2 values on some radionuclides will have a negative impact on transportation operations. The proposed reduction in the activity concentration value for Thorium-228 and accompanying radionuclides - progenitors and progeny - to 1 Bq/gm (27 pCi/gm) will result in a

change in classification from LSA-I to LSA-II for a portion of oil field NORM material. Thorium-228 is a decay product of Radium-228, which can occasionally occur at concentrations of 20 to 50 Bq/gm in some oil field scales. The LSA-II threshold for Th-228 by itself is 30 Bq/gm (810 pCi/gm) and if this value is changed, the shipment of a greater portion of our higher activity scale may be required to be LSA-II instead of the current LSA-I.

Oilfield NORM can contain Thorium 228 as a natural decay product of the parent Radium 228. Per the proposed mixture rule requirements and the low A2 quantity for Thorium 228, what previously could be safely shipped and handled as non-regulated material would be required to be handled as regulated "radioactive material". The use of this low A2 threshold for Thorium 228 is a clear misapplication of the exposure scenarios on which the original transport regulations and the IAEA Safety Standard Series were based.

The transportation rules were conceived so that, in the event of a transportation incident, no individual would be exposed above a given value per incident. This exposure was then translated into default values for a range of isotopes. The assumption for the isotopes was that they were being shipped as nearly pure mixtures or salts of the isotopes themselves. In addition, it was further assumed that these materials were readily bio-available and easily dispersed into respirable-sized particulates. Consequently, for relatively radiotoxic materials like Thorium very low limited quantity and A2 values were calculated. These conservative assumptions have worked very well for a range of materials that are transported as high concentration materials or as relatively pure salts such as thorium oxide. However, these assumptions do not apply to materials such as oilfield NORM which share much closer physical and chemical characteristics with natural mineral ores than to material intended to be processed for use of the radionuclides they contain.

The chemical form of thorium 228 in oilfield NORM would be present in the scale matrix that contains its parent isotope, radium 228. The most prevalent scale matrix for oilfield NORM is Barium Sulfate (although some amounts can also be present in carbonate scales as well). The thorium 228 contained in these NORM materials has a very limited potential for dispersion and subsequent uptake by an individual because of its typical particle size and limited solubility, especially in body fluids. Barium sulfate is a highly insoluble chemical which, when ingested, passes through the human digestive tract. Any Th-228 in ingested BaSO₄ scale will likewise pass through without being absorbed. Extreme measures to control this Th-228 seem unjustified and out of reason with any hazard related to oilfield NORM.

NORM material in transit is either attached to the sides of piping or vessels or in the form of waste sludge or NORM impacted soil. Consequently, in the event of any conceivable transportation incident, very little NORM material would become airborne and an even smaller percentage of the airborne material would be in the respirable range. This is verified by survey data collected on NORM decontamination workers. Most of the reported data suggest that 30 millirem per year are typical doses for ionizing radiation workers who are exposed to NORM impacted equipment and waste during their working hours. To help to put the issue into perspective, almost none of the workers' dose is from exposure to particulate radiation and their only exposure is in cleaning NORM impacted equipment. It is also interesting to note that the total radiation dose is barely above background.

Thus, this change in classification of A2 values on some radionuclides is not justified based on the oilfield NORM exposure risk scenarios.

Impact on Shipping Pipe and Equipment

Another concern relates to shipping pipe and other equipment or materials containing NORM scale. Lengths of pipe known as tubing and casing are up to 30 feet long and, when NORM is present, it typically is contained on the inside of the pipe. Current practice consists of capping the ends to contain the NORM inside the pipe and shipping as an IP-1 package. Because the isotopes of concern (Radium 226, 228 and progeny) are not considered to be low toxicity alpha emitters, the extremely low SCO-II threshold of 0.4 Bq/sq. cm. applies. Some of the scales we encounter can be removed through physical impact and may be classed as non-fixed contamination (although it may not fail a wipe test). Under a more stringent classification, the equipment would require either an SCO-II classification OR classification as LSA-I or LSA-II. If LSA-II applies, then shipping becomes extremely difficult for this pipe, as LSA-II shipping requires IP-2 containers.

Either classification is problematic in that these higher level classifications must be shipped using "exclusive use" conveyance. This complicates the transport of the material and increases the costs of doing so without providing any benefit in increased safety. In addition, it is unlikely that the industry would be able to conduct the testing required to obtain an IP-2 classification for used pipe. Neither of these actions is justified by the risk the shipment presents. The NORM is effectively self contained in the equipment and would not release its contents under normal transportation conditions.

Increased Number of Shipments Classified as "RADIOACTIVE"

The proposed rules will result in an increase in the number of shipments that are classified as "radioactive" simply due to the change in regulations. Note the number of shipments will not increase, merely the number that would require a radioactive placard. This does not serve the interest of the public, rather this type of regulation will risk generating unnecessary public concern over such shipments. In addition, increased shipments would inevitably lead to more accidents involving these radioactive placarded shipments, requiring a hazardous materials response for shipments that represents no significant hazard under current regulations. This would put a burden on state and local public agencies that is not justified and would reduce their ability to respond to other significant events.

Impact on Oilfield Waste Disposal and Availability

The industry is further concerned that there will be a de facto reduction of available disposal sites for material which is below the concentration currently considered NORM by the regulatory agencies. The few sites available for disposal of regulated radioactive waste are expensive to use and would increase transportation distances and risks. Currently, soil with marginally increased radium 226 and 228 concentrations can be disposed in non-hazardous oil field waste facilities. This material will be below the current 2000 pCi/gm radiation limit and may be below 30

pCi/gm concentration of radium 226. However it may well exceed the new threshold for placarding the shipment as RADIOACTIVE. Sometimes these materials are safe and suitable for disposal in a Class D landfill. A recent DOE report (DOE/BC/W-31-109-ENG-38-8, OSTI ID: 13061) has verified the suitability of these materials for disposal in a landfill. Bringing the definition of radioactive material down to less than 30 pCi/gm would require significantly more disposal volume at radioactive waste facilities.

We believe that an attempt to dispose of such waste in a Class D landfill, while entirely safe and legal, would be prohibited if the truck carrying the waste bears a RADIOACTIVE placard. The end result will be that we would be required to dispose of the non-radioactive waste (as defined by state rules) in radioactive waste facilities. This will increase our disposal costs substantially and no identifiable public good will result from the redefinition of radioactive material. It also means that scarce disposal space, which should be reserved for truly radioactive material that could pose a hazard to the public, will be used for material that poses no public health risk and can safely be disposed of in other locations.

The Proposed Changes Preempt Existing State NORM Regulations

The proposed DOT regulations for shipping, manifesting and labeling NORM waste materials preempt several state NORM regulatory programs. Oil and natural gas producing states have developed extensive oil field waste regulatory programs to ensure proper waste management and disposal for NORM containing equipment. Furthermore, specific regulations within oil field waste regulatory programs have been developed that address the unique nature of NORM associated with oil and natural gas production operations.

The various states with NORM regulations in place have established 30 pCi/g for Radium 226 or 228 (and progeny in equilibrium) as a threshold for special disposal requirements. Materials less than 30 pCi/g are generally exempt from control and do not require disposal at permitted NORM waste disposal sites. In other words, materials containing NORM less than 30 pCi/g Ra226 or Ra228 may be disposed at state permitted oil field waste facilities that accept drilling muds, drill cuttings, formation sands, sludges and other associated wastes. Under these state rules, oil field wastes containing NORM at less than 30 pCi/g Ra226 or Ra228 are not subject to labeling, placarding and manifesting. Hence the proposed DOT standard would add new regulatory requirements for management of NORM containing wastes by requiring identification as radioactive material that far exceed the rules determined by the states for the protection of public health.

In addition, many state rules establish an external gamma reading action level of 50 uR/hr for oil field equipment. Equipment reading below this threshold is not subject to NORM regulations. The lower activity limit of the proposed DOT rules would reclassify material and equipment above what a state has deemed as not presenting a hazard and not radioactive material for shipping purposes. This effectively preempts the states' control of NORM and moves it to the DOT. It also significantly complicates the issue of just what is considered a hazardous material.

Limited Quantity Shipments

Many of our shipments currently fall under the excepted package rules since they contain a limited quantity of activity. This is a very useful concept, allowing quick shipment of samples without requiring a manifest to laboratories and even small shipments for disposal. Many pipe goods fall within the bounds of an excepted shipment. These may have a scale deposit containing radium 226 and radium 228 that exceeds the 2000 pCi/gm threshold but the pipe (about 2 3/8 inches diameter by 30 foot length) may contain only a few pounds of this scale. Changes reducing the excepted package rules will require the shipment of this material as SCO-I with its attendant paperwork. The shipment and conditions will be identical to what is current practice except for the attendant paperwork.

Additionally, the limited quantity postal amounts are now reduced to 10 per cent of the limited quantity shipment. This will affect shipments to labs for sample analyses. The quantities we ship are very low and under current practices they provide well for the public safety. Effectively, the potential impact of this change will make it necessary to increase the number of samples shipped to obtain the same analysis results that could be obtained via one shipment in the past. This does not decrease transportation risk, it increases risk. It will also increase the costs associated with characterizing a NORM impacted site.

Finally, in discussion with RSPA staff, we formed the impression that the Table I values for activity concentration limits and exempt consignment limit were both required to be exceeded to have a shipment which was covered by the hazardous material transportation regulations. We would appreciate receiving confirmation that this understanding is correct.

Gamma Flux is a more useful tool to determine transportation risks for Oilfield NORM

Given the characteristics of oilfield NORM materials the only potential radiation risk that exists from any conceivable transportation incident is exposure from the gamma radiation present from the NORM waste or equipment itself. These risks have been very well controlled by the existing transportation rules requiring that packages and loads with specific dose rates be handled according to the appropriate shipping classification. For oilfield NORM, the most appropriate way to determine the appropriate shipping classification is on the basis of the external gamma flux that the material presents.

Very little, if any, benefit is derived from detailed isotopic analysis in controlling transportation risks for NORM. It simply adds another level of confusing and burdensome testing and paperwork requirements. If shipping categories for NORM could be determined by their external gamma readings alone, the safety of transportation would be maintained, consistency with State NORM rules would be enhanced, and compliance by the regulated community would be facilitated. API recommends that the DOT adopt this as an option for handling oilfield NORM shipments.

Overall Impact of Proposed Changes

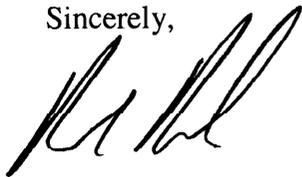
DOT's proposed change will have a significant effect on how our industry's routine shipments of low-level NORM are handled. These effects include the following:

- (a) Because the proposed definition of radioactive material includes such a low threshold, nearly all shipments of oil and natural gas industry NORM will be required to display radioactive materials placards even though the actual material, which consists of sludge, scale, produced sand and water, has very low levels of radioactivity and does not represent an external exposure hazard.
- (b) The proposed rules effectively preempt existing State NORM rules by classifying much oilfield waste and equipment exempted by the State rules as "radioactive material" and therefore making them regulated material.
- (c) Shipments to non-NORM disposal sites will be required to have radioactive material placards which, in turn, may require shippers to respond to incidents, involving materials which are below current state thresholds.
- (d) The combination of (a), (b) and (c) may lead to an unfounded fear by the general public of a proliferation of radioactive materials shipments and incidents.

API members believe the current regulations are effective and should not be changed in light of these unintended results. If DOT believes the existing rules need to be strengthened to protect public health, we urge you to consider the use of gamma flux methods for classifying shipments. This alternative can assure that materials are appropriately handled without imposing a significant and complex compliance burden on the regulated community. It would not be necessary under these conditions to modify the current 2000 picoCuries per gram threshold for radioactive material placarding. API would be glad to meet with you to discuss this option further.

API appreciates DOT's consideration of our specific comments. While there are aspects of the proposed rules that would be beneficial, there are portions that would be overly burdensome without adding any improvement in public health, and may even do harm. No cost-benefit analysis is presented that demonstrates the proposed change in the rules is justified. In addition, some of the proposed rules are susceptible to misinterpretation that could allow incongruous results. If you should require any additional information on API's comments, please contact Jonathan Jordan of API's staff at (202) 682-8147. We look forward to working with you to achieve these goals.

Sincerely,



Mark Rubin