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RSPA-99-6283-157

**ENVIRONMENTAL COALITION ON NUCLEAR POWER**

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**NEW ENGLAND COALITION ON NUCLEAR POLLUTION**

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RE: 67 FR 83, 21328-21388 April 30, 2002  
Docket No. RSPA-99-6283 (HM-230)  
RIN 2137-AD40 49 CFR Part 171, et. al.:  
Hazardous Materials Regulations; Compatibility  
with the Regulations of the International Atomic  
Energy Agency: Notice of Proposed Rulemaking

These comments on the Department of Transportation (DOT) Notice of Proposed Rulemaking are submitted jointly by the New England Coalition on Nuclear Pollution and Pennsylvania-based Environmental Coalition on Nuclear Power. Both of these not-for-profit public-interest organizations have been engaged for more than thirty years in protection of human health and the quality of the environment with respect to impacts from the production, utilization, and waste management of nuclear energy. We are deeply concerned that this Proposed Rule of the Department, if it is promulgated in its present form, will result in marked increases in short- and long-term damages to human health and to the quality of the environment for which we all have responsibility. We must therefore oppose promulgation of this rule. We ask that it be withdrawn, reconsidered, and revised.

We first respectfully request that the DOT extend this public comment period for at least 180 days beyond the July 29, 2002, deadline to allow for more public input for the following reasons:

- \*\* This Draft Rule was published simultaneously with, and is closely allied with, the Draft "Harmonization" Transportation Rule of the Nuclear Regulatory Commission (NRC), which we also criticize and are asking to be withdrawn for reconsideration.
- \*\* The background documents were not available to us until the joint DOT/NRC agencies' public meeting in Rockville, MD, in late June.
- \*\* We have not had access to the International Atomic Energy Agency TS-R-1 documents, which are the regulations that this DOT rule is designed to harmonize with.
- \*\* The future impacts of these proposed regulations must be evaluated in concert with associated proposed rules for the release, recycle, and reuse of large quantities of radioactive materials and wastes that are being developed by the Department of Energy (DOE), the state-level Conference of Radiation Control Program Directors (CRCPD), and the NRC.
- \*\* Entire populations in this country and worldwide will be affected far into future time by the outcome of these related regulatory decisions. Very few members of the public are even aware of this or the other related proposals – all of which will result in deregulation and loss of control over radioactive materials and wastes. Many with whom we have raised the issues cannot believe that our governmental agencies intend to condone the deregulation of materials and

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wastes generated by the nuclear industry to what can only be the ultimate detriment of public health and safety. International regulators are now agreeing that they have neglected to ascertain the impacts of low dose and low-dose irradiation on other forms of life and total biosystems -- not merely accept extrapolations from high-dose impacts on Standard Man.. Thus, much basic research remains to be done

With respect to inadequacy of public comment: for so significant a set of regulatory actions affecting such large populations, only two belatedly announced -- seemingly almost secretive -- "public meetings" are entirely insufficient. The entire nation should have fuller opportunity to attend and be heard. We therefore also ask that a full complement of additional public meetings -- and formal hearings ( even if not customary in DOT) -- on the current version of the draft rule be held nationwide at accessible locales, and that they be announced with lead time sufficient for members of the public to be aware, to prepare, and to attend.

We also request that DOT, as well as NRC, withdraw the current draft rule(s) and revise in a number of ways that will be addressed below, especially including, in the aftermath of the September 11, 2001, sabotage and attacks, full assessments of the various and worst case scenarios for in-transit damages from terrorism that may occur. It is unconscionable for either agency to refuse to address this most serious issue in this draft rule. The DOT's own statements that it is only now undertaking a review of security issues speaks to the need for holding up final promulgation of this rule.

Moreover, it is imperative that the DOT and NRC both review all new data on transport routes, vulnerabilities, and accident experiences more recent than the 1985 data that were used in the development of the Draft Rule(s). These are important, given that the proposed rule(s) could result in very large increases in both the numbers of shipments and distances traveled of these hazardous radioactive materials and wastes. For these reasons as well, we request that the Draft Rule(s) be withdrawn for reconsideration.

### **Comments on Proposed Changes in this NPRM:**

#### *A. Summary*

ECNP and NECNP hold that transportation of radioactive materials and wastes must not be allowed to be relaxed for, *inter alia*, the reasons cited above and below. Of items listed in this section, we can support a few but cannot support most, and request DOT to withdraw the latter.

\*\* Nuclide-specific exemption activity concentrations and nuclide-specific exemption consignment activities listed in TS-R-1. It is not essential that the United States alter, relax, or abandon any of its regulations or regulatory authority, or resort to exemption of radioactive materials or wastes from regulatory control. Stringent regulations are required to protect the U.S. population and our environment from radiation damages. If U.S. transportation regulations are more restrictive than those of the IAEA or other nations with respect to international

trans-boundary trade in radioactive materials, we suggest that those nations and IAEA have the option of foregoing trade in radioactive materials and wastes or of meeting our requirements, rather than our reducing our level of protection. We are strongly opposed to the adoption of rules that would allow deregulation, release, recycle, or reuse of radioactively contaminated materials or wastes. This rule would do those things. Moreover, no one should be required to be subjected to additional radiation exposures (however allegedly "small"), either without receiving a benefit equal to or greater than the added risk incurred by the recipient, or absent his or her informed consent. Those requirements are the very foundation of radiation protection and must not be abandoned.

\*\* "Naturally-occurring radioactive materials (NORM) [and technologically-enhanced (TENORM)] exception from HMR if specific activity is below 10 times the activity concentration exemption values." This exemption of NORM [and TENORM] should not be allowed. Some naturally-occurring radioactive materials may be very detrimental to human health. Much NORM and TENORM have already been released into the biosystem and are available to add to doses that are additive to background exposures. Only now is the CRCPD requesting peer review of its draft model regulations to bring NORM and TENORM under control. The public has not been notified of, nor reviewed and commented on, those pending related regulations. None of these materials should be exempted from control by DOT, for they would be yet another additive source of doses to members of the public without benefit to the recipient or ability of the recipient to detect, measure, or avoid them.

\*\* The "new class" of LSA-I material that DOT has described as "radioactive material in which the activity is distributed throughout." That definition would appear to fit the definition of volumetrically contaminated material which is, at present, prohibited by DOE from release and recycle. Nor, to the best of our knowledge, has the NRC approved general exemption for volumetrically contaminated radioactive materials. The DOT allowance of exemption of materials having an estimated average specific activity at 30 times the activity concentration exemption level should be eliminated from the proposed rule, as should also the exemption of the extremely broad category including mill tailings, contaminated earth, rubble, other debris and activated material with specific activity less than 10 to the minus 6 A-s /gram.

\*\* Incorporation of TS-R-1 changes in A-1 and A-2 values into HMR would result in increases in doses from some radionuclides without demonstration of commensurate benefit to recipients of doses, and would exempt others from regulatory control altogether. We must oppose such changes as being contrary to the protection of public health and the general welfare and ask DOT to remove them from the rule.

\*\* In the absence of full access to IAEA documents, from the information provided, it is impossible for commenters to know if the 1993 ISO 7195 edition is more or less protective than ANSI N14.1. But we are aware that, historically in the U.S., transport cask testing has been insufficient to assure safety. We urge that the most restrictive tests that can be devised for drop, pressure relief, and heat resistance be adopted for all transport containers..

\*\* It is unexplained here why Type C packages, fissile LSA material, and fissile SCOs should be exempted from shipping names and UN identification numbers. It is our position that the transportation of radioactive materials and wastes first needs to be kept to a minimum, and also that there is no societal health and safety benefit to be gained from engaging in expanded international trade in these materials. Quite the opposite. Identification exemptions worsen the situation.

\*\* The customary, or traditional radiation measurement units with which Americans are familiar, should be retained on all packages and transport vehicles. The SI units may be included but, in the U.S., it is the SI units that should be shown in parentheses.

\*\* It is not evident from the information provided that benefit to the public is derived from substitution of the Criticality Safety Index (CSI) for the customary Transport Index (TI). In any event, to minimize damages, the maximum amount of information should be made available, in the event of accident or attack situations.

\*\* The adoption of the variety of identification markings would appear to be a source of confusion rather than assistance. Markings that indicate the contents of a package or shipment would be of utility and should be required. (We often see on the highways trucks marked only "hazardous" or "dangerous" but with no visible notice of what the contents are.)

\*\* It is a mistake to remove the words "Radioactive Material" from transport vehicles. It is invaluable for the public to have a clear warning of the nature of the contents of a truck or train.

\*\* The reference to the presence of plutonium should be retained. Weight should not replace activity but may be added to it in the shipping documents and package labels and descriptions. All persons who may come in contact with these containers must have immediate access to information concerning the content and hazardous nature of the shipment. A radiation warning symbol should be attached to every package or container and carrier, in addition to other vital safety information. In no case should control or containment of plutonium shipments be relaxed.

\*\* In accordance with our opposition to exemptions, we would oppose exempting fissile materials from DOT regulations.

\*\* Use of IAEA transitional requirements would be acceptable only if they are no less rigorous than current U.S. transport requirements.

\*\* Replacement of all outdated Type B packaging with only more rigorously tested designs is a supportable provision and we favor it. If the date of promulgation of revised transportation regulations is delayed, however, the period of time for continued use of the older designs should not be. We would contend that some, if not most, current packaging and containers are not sturdy enough to withstand true worst case accidents. (This commenter recalls for instance some years ago, in the Wyoming Wind River Range, a boulder the width of the highway and as much

as twenty feet in height that had fallen several hundred feet -- only two cars ahead of us one dark night. Any existing container would have been shattered beneath it. It was not a theoretical event.

\*\* Enclosure by non-radioactive components of active material should be required for all shipments – without allowing “excepted packages.” One of our concerns is that, if the practice of deregulation and recycling of radioactive materials and wastes becomes accepted by regulatory agencies, those materials will be used in containers, as well as for other purposes, thereby defeating any intent of preventing, or at least minimizing, additive exposures to the public.

*B. Issue Discussion:*

In the following section, we attempt to respond to the Issues listed, but may not include positions on all of the accompanying comments and suggestions in the discussion. Lack of inclusion of some comments and proposals does not necessarily mean agreement with them.

Issue 1. Nuclide-Specific Exemption Values: Exempting radioactive materials and wastes from regulatory control is a dangerous, as well as slippery, slope. For the regulatory agency to do so, as it states it has been doing, and as is proposed in these draft regulations, is an arbitrary disregard for potential harm against which the agency has a statutory duty to protect the citizenry. The 1990 National Research Council BEIR V Report clarified rejection of “safe threshold” in favor of the linear dose-response relationship. DOT, as well as NRC, DOE, EPA, and other agencies should abide by that position. The statement that international regulatory authorities consider 70 Bq/g to be “sufficiently low as to present a negligible risk” is an insufficient justification. To our knowledge, those international authorities are not specifically identified; they may not concur with the U.S. BEIR Committee’s 1990 conclusion with respect to threshold.

In the discussion of Safety Series 115 and Radiation Protection-65, the “collective dose to all persons exposed to those practices and sources in a year *for normal conditions* is 1 person-Sv (100 person-rem).” (emphasis added) Because the person-rem of a collective dose may be unequally distributed among those in the included population, the assurance of “inherent safety” mentioned earlier in the discussion rings false. Thus there is no assurance that the maximum individual dose would be limited to only one mrem per year. It might be a large portion of the 100 mrem. Moreover, there is no consideration given here to multiple sources of exposures.

Under the linear no-threshold hypothesis used in radiation protection, no irradiation that is additive to naturally-occurring background levels is considered to be “safe.” We recognize that this statement may not address certain exposures, such as those used for diagnosis and treatment in medical practice. Some contend that hormesis or adaptive response may be positive effects of exposures, but we are mindful that naturally-occurring background radiation is also deemed to be the source of substantial numbers of annual fatalities, according the father the health physics profession, the late Dr. Karl Z. Morgan, and others. The discussion in this Issue section (at 21330) is confirmation of our basic objection to “harmonization” of American regulations with those promulgated by an international body that appears to disregard or under-estimate radiation

harm. For these reasons, we are in opposition to the exemptions proposed here and ask DOT to withdraw this proposal. Redefining "radioactive material" as is raised in this discussion section is also inadvisable and should be rejected by DOT.

Issue 2: Naturally-Occurring Radioactive Materials: Because some of these materials may be of substantial hazard to transport workers as well as the general public, because their hazard may be ignored due to their origin, and because NORM carried without regard for the radioactive components may then pass into unrestricted commerce, it is all the more important that NORM and TENORM shipments be handled with regard for their potential to cause harm, whether or not they are intended to be processed for their radioactive components. The public (and worker) health and safety are better protected by taking account of the radioactivity of these, and all, shipments, and providing an ample level of protection.

Issue 3: Changes in A-1 and A-2 Values: In the discussion of the radiological assessments of potential doses in the event of Type A package failures in the course of accidents, it is noted that the draft states, 'Reference doses that the model uses were unchanged' and that the "reference doses are the dose values that are used to define a 'not unacceptable' dose in the event of an accident. (emphasis added) This explanation is puzzling and indicates that the A-1 and A-2 values then adopted by DOT are open to question as to their protective significance. Elsewhere it is stated that for some radionuclides the doses increase, while others decrease. Given these apparent variations and uncertainties, the agency would be advised, at minimum, to require more protective containment. All doses should be lowered by use of more protective and more exhaustively tested containment of all radioactive materials and wastes in transit. We note, too, that DOT admits that IAEA is planning in its 2003 TS-R-1 revision to revert to values currently in DOT's HMR for californium-252. This suggests that U.S. regulatory agencies are opening themselves to greater uncertainties or errors by attempting to "harmonize" our requirements with shifting ones of the IAEA. We recommend that, in all instances, for regulation in the United States, the DOT should adopt the most restrictive options available, even if at greater costs to licensees, rather than accept weaker ones of IAEA (or on DOT's own initiative). Weaker rules are not acceptable to the U.S. public even though they may be acceptable to the notoriously pro-nuclear industry IAEA that is under constant pressure from those who wish to increase trans-boundary trade in nuclear materials. Reducing regulatory controls to meet the IAEA's regulations is not in the public or national interests of the United States.

Issue 4: Communication Changes: Comments on some of these changes are addressed above. As for the use of SI units, both the American people and the users of radioactive materials are accustomed to the traditional units, rather than the international ones. Although, as with the metric system, we ought to be able to change, it is for safety's sake that we recommend that DOT adopt use of the traditional units, including SI units parenthetically. Perhaps some year Americans will adopt the metric system -- and the SI units. In addition, It is not clear what advantages are gained by the proposed changes in identification, apart from conformance with IAEA, which is a questionable virtue. What does seem evident is that grandfathering the old and switching to the new will introduce confusions in the system for what seem to be little or no

benefit. It is not only the trained carrier personnel to whom this information is of importance, especially in the event of accidents or possible theft of materials in transit. We do, however, support requirement of clearly worded and visible placarding, front, rear, and all sides, of all shipments of radioactive materials and wastes, with information adequate for assistance in the event of accidents, attack, or diversion. All plutonium shipments should be very clearly labeled. This commenter has observed that some carriers allow warning placards to become illegible, covered with roadway grime and mud, thereby reducing safety. Regulations should provide for a legibility (readability) requirement.

Issue 5: Low Specific Activity (LSA) Materials and Surface Contaminated Objects (SCO): In light of the current lack of NRC regulations and the DOE ban on releasing volumetrically contaminated metals and other materials from regulatory control, we are puzzled by the description of the IAEA LSA-1 as consisting of those “in which the activity is distributed throughout.” As stated previously, adoption of this definition and regulations governing what is termed “LSA-1” appears to be in violation of the existing DOE prohibition. DOT states that it plans to adopt the TS-R-1 classification of “other radioactive material” in which the “*estimated average* specific activity does not exceed 30 times the activity concentration values.” (emphasis added) In determining safety, “averages” can be misleading. A level thirty times higher than higher than the activity concentration levels seems, on its face, out of line with providing appropriate protection. (The “contamination definition” that DOT says it plans to adopt should be given in this section.) We must oppose any changes in this section that could result in exemptions or lessening the degree of protection for the public and workers.

Issue 6: Uranium Hexafluoride (UF-6): Highway accidents with UF-6 are not unknown. To us, it seems unconscionable that IAEA would allow waiver of design requirements for thermal and in-leakage tests for certain quantities of UF-6. Regulatory reliance on the good QC record of a manufacturer may have been acceptable in the past, but, apart from and in addition to the new post-September 11 realities, the contemporary corporate scandals should be altering this and other regulatory agencies’ tendency to trust the integrity of all their licensees, manufacturers, contractors and others. This is an issue that has tended to be ignored by regulators at the public’s peril. The important message of the current scandals is: “Trust no longer. Regulate.”

Issue 7: Air Transport Requirements: The movement of radioactive materials and wastes by air is, almost by definition, dangerous. Plane crashes may be touted as rarities but they do indeed occur, and often with tremendous destructiveness to all contents of the aircraft. No high-level or exempted materials should be allowed on airplanes, including those that DOT would define as “Low Dispersible Material.” We suggest that Type C packaging should be adopted (following full proof-testing) for any unavoidable (but rare) air shipments. No radioactive materials or wastes should be permitted on aircraft (even in a baggage compartment) without special protective packaging or containerization, even absent any accidents.

The Type C impact test seems to be a substantial improvement over the old 9-meter (c.30-foot) drop test, but we would agree with the commenter who is cited as urging adoption of the

129 m/sec that s/he claims has been adopted by Congress. However, a mere 60-minute burn test is unquestionably inadequately protective, for either a plane crash, or, for example, a truck carrier, caught in one of the rapidly spreading, fiercely burning forest fires of the current season, or a head-on train or truck collision, with one or both carrying highly combustible materials that prolong an uncontrollable fire.

As for a permissible Low Dispersible Material (LDM) external radiation level up to 1 rem/hr at 3 meters: that dose level is unacceptably high for either some unsuspecting member of the public coming into close proximity with a truck or a worker for an extended period of time. If such exposure levels are permitted in the cramped space on airplanes, this allowable limit is all the more unacceptable for a member of the public or a worker in confined area. How high a maximum dose is the worker allowed under this proposal? How many such additive exposures are permitted? We particularly take note of the reference to the possibility of MOX fuel being assigned to the LDM category and allowed to be shipped by air, and we strongly oppose this proposal. No relaxation of any packaging or exposure standards pertaining to plutonium shipment should be promulgated by DOT or NRC. We very strongly oppose the NRC's apparent intent not to adopt Type C packaging requirements. DOT should adopt them, but with substantially more rigorous testing requirements than are proposed, especially for fire and water.

Issue 8: Fissile Material Package and Transport Requirements: RSPA states its belief that it "has no authority to make unilateral changes in IAEA documents" but the Department is not required to adopt provisions of IAEA TS-R-1 (or its future revised versions). Since the Type C packaging requirements appear to be more protective than current containers, it is both unfortunate and unacceptable that neither agency intends to adopt the more protective shipping containers – especially unfortunate for air transport. In our opinion, fissile materials should be retained under regulatory control, not exempted. Simplification of transport, as suggested in the discussion, is not the primary goal. It is not clear that existing or planned criticality safeguards are also adequate to protect against maximum accident or attack security scenarios. Those should be the major goals, in addition to criticality prevention.

Issue 9: Transitional Requirements: Substantial additional requirements for existing packages are needed. Containers and packages for shipping radioactive materials and wastes must be redesigned and subjected to far more rigorous testing to be certain that they are capable of withstanding accidents and attacks that may well be far more severe than had ever been anticipated in the past. This is the unfortunate reality of the new century and millennium. The secure world our nation had known has been altered. But this agency has Congressional mandates under Hazardous Materials and Atomic Energy Acts to assure the public safety. The laws require compliance. It would be senseless as well as wasteful for the agency to proceed now with this draft rule, especially while its own research is underway on new regulatory and national security demands resultant from September 11<sup>th</sup>.

Issue 10: Other TS-R-1 Changes: We urge that DOT not approve or use "excepted packages" if, as is indicated, they are going to be designed only to "prevent release of the active contents *under*

*normal conditions of transport.*” (emphasis added.). Destructive surprise attacks are not “normal conditions of transport.” Europeans and IAEA may be content with that wording, but they did not directly experience the events of September last as did Americans. For many years, our public interest organizations have conscientiously avoided discussing potential sabotage or terrorist attacks on nuclear facilities. We had no intention of putting insane notions into the minds of unstable or vengeful people. But now the topic has intruded on our citizenry and must be frankly and openly confronted – and prepared against. It would be arbitrary in the extreme for this agency to refuse to do so prior to adoption of these transportation regulations that were prepared prior to the terrorist strike on our nation.

### **III. Section-by-Section Review:**

In order to reduce repetition, we will not here address details of each section of the proposed rule presented in this section. Some additional and re-emphasized points follow.

NECNP and ECNP recommend strongly against adoption by DOT or NRC of any provisions that exempt or result in exemption of any radioactive materials and wastes that may be subject to DOT’s transportation regulations. Of particular concern are the numerous sources of additional exemptions and deregulations that are already occurring and that are being proposed and adopted by other federal and state agencies. Each of these regulatory actions augments the risks of multiple sources of additive and cumulative exposures. Each such action expands the likelihood of additional doses in concert with other, interactive, harmful substances – synergistic damages.

Additive pathways of release and reuse and of more undetectable exposures to individuals include the international trade in radioactive substances that the IAEA harmonization is specifically designed to promote. Under these less stringent DOT regulations, materials and wastes that originate in nations that may have previously adopted less restrictive IAEA regulations -- and that would therefore have been exempted from control abroad -- would be able to enter and travel and enter into commerce and use in the United States as if they were not radioactive. Materials and wastes from this country similarly would be enabled to be declared exempt by NRC or DOE or CRCPD, to travel and be exported to unsuspecting nations for uncontrolled uses elsewhere in the world.

Some radioactive materials that move through brokers and treatment facilities where partial decontamination may occur could then move into commerce with exemption but adding to the overall radiation exposure burden for members of the public. The Department and its counterpart regulators must revise all assessments of the totality of potential additive doses to members of the public and to workers – not rely on just the doses to the fellow exposed to slag in the workplace. All risk assessments must be revised to incorporate totality of doses, based on the recipients of highest sensitivity and considering all sources and all health, latent health, and genetic consequences, inability of recipients to measure doses received, and the many other factors of transport safety, accidents and threats.

We oppose any relaxation of protective standards throughout the rule. Standards should, instead, be made more restrictive to assure greater safety in normal movement, and far more stringent to guard against truly worst case accidents, attacks, or diversions. If wastes and materials are to be moved about, we urge adoption of far more strict container testing and packaging requirements, informative labeling of all packages and transport vehicles carrying radioactive materials or wastes, and radical increases in the level and frequency of emergency response training and drilling. The issues of routing must be thoroughly aired in all communities along proposed routes for truck, train, or other means of transport. Waterways are not suitable and should not be approved. We urge adoption and use of Type C containers if movement is essential.

The term, "radioactive material," must not be redefined as is proposed in Subsection 173.403. Materials that are radioactive must not be released from control, nor allowed to escape into the marketplace for re-uses that result in harm to the public or total loss of control into the biosphere. The kind of release that is being contemplated in this action is essentially irreversible. The resultant damages may occur far in the future, with no reliable way for those who are victimized by this DOT regulation to obtain justice for the harm done to them. If ever the Precautionary Principle should be invoked and adopted, this is the time and place; and we so recommend.

Demonstration of a high standard of necessity should be set in order to obtain permission to ship radioactive materials and wastes about from place to place, with the full burden of demonstrating the need placed upon the applicant or licensee, not upon citizens or local officials to show why the transport should not occur. Reduction of the quantities of radioactive materials in commerce should be the underlying principle for all regulators. For example, in some situations, applicants for licenses to utilize radioisotopes are required to provide justifications that no other material or technique will serve the purpose and must factor in full costs of post-use control and isolation.

No changes in generally understood and accepted definitions of terms should be adopted or allowed by the agencies. DOT should use the familiar units of measurement for radionuclides, perhaps secondarily adding the international SI units that are less well known in the United States. Manipulable dose limits (e.g., standardized assumed organ weighting factors) should not be permitted to replace measurable activity and concentration limits.

All risk assessments should be based on inclusion of all deleterious health and genetic effects on the most sensitive members of the population -- the elderly, infirm, disabled, pregnant women, rapidly growing young children, infants, the fetus, embryo, and the ova. It is time for Standard Man to be retired from his solitary primacy in the calculation of doses. And all impacts of ionizing radiation, at both high and low dose levels and including latent injuries, must be included in health effects determinations and risk assessments, not only lifetime risk of fatal cancer and gross genetic defects.

Current research results pertaining to the mechanisms of radiation injury must be considered, and the assessments must be conducted by independent experts -- not by persons with a history of connections with the promotion of the uses of nuclear energy or research grants or financial

relationships that constitute any conflicts of interest. In short, the Department needs to start over, independently of the IAEA, to shore up the protection of the American people from potential harm caused by unanticipated – or anticipated – events in the course of moving radioactive materials and wastes from place to place. The paramount objective of all regulations of radioactive substances must be, not protection or support for the commercial or military nuclear industry, but rather maximum protection of public health, safety, and environment. And no radioactive materials should be exempted from rigid and comprehensive regulatory controls.

#### **IV: Regulatory Analyses and Notices:**

Despite the claims that the proposed rule is not “a significant regulatory action” under Executive Order 12866 and DOT’s Regulatory Policies and Procedures, this agency will be derelict in its statutory duties, and outstandingly capricious under the requirements of the Administrative Procedure Act, if it fails to treat promulgation of these regulations with the utmost seriousness and care. Protection of public health and safety in this country far outweighs any obligation to assist “access to foreign markets.” Although costs are always a factor, they must not be given primacy over adherence to strictest standards and regulations protective of health and safety.

Under no circumstances should the DOT attempt to exercise preemptive authority that overrides or contradicts the responsibilities of local, state, and tribal officials to protect their jurisdictions and their populations from harm. These domestic considerations must take primacy over the international rules. We note reference to the burdens of dual regulation and advise that there may be distinct advantages to dual regulatory authority – especially if one of the actors is intent on minimizing the requirements in order to accommodate the wishes of the regulated. In this regard, an example may be cited of the recent EPA decision to relinquish its regulatory control over mixed hazardous and radioactive wastes – a dual regulatory responsibility with NRC. The wastes were declared to be exempt under RCRA permitting requirements, even if the hazardous component had not been removed. As a result, the NRC becomes the sole regulatory authority, and is in process of again developing regulations that would allow release, recycle, and reuse in consumer products and for other purposes, under its proposal to adopt a decommissioning “clearance” rule for low-level radioactive wastes.

Because the movement of radioactive materials – especially intensely irradiated “spent” fuel – is likely to affect tribal lands, particular care should be exercised in meeting the concerns of Native American officials, contrary to the assertion in *C. Executive Order 13175*. This revision of 49 CFR Part 171 is indeed a major federal action – termed a “major revision” by the brother agency, the NRC. As such, it should be preceded by a full Environmental Impact Statement under the National Environmental Policy Act, not a perfunctory Environmental Assessment, as the NRC has done. For DOT to refuse or fail to do so would constitute an impermissible dereliction of duty -- in the wording of the Administrative Procedure Act: arbitrary, capricious, and contrary to applicable laws.

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## **A BRIEF SUMMARY OF THE STATUS OF OUR UNDERSTANDING OF HEALTH EFFECTS OF LOW-LEVEL RADIATION**

With advanced research techniques in recent years, our knowledge and understanding of the impacts of ionizing radiation on human health and safety are changing. In the half century since the splitting of the atom, the many uses of atomic energy for nuclear weapons and for domestic commercial purposes, including nuclear power reactors, have contributed to increasing levels of radiation in the biosystem.

For years, physicians and nuclear scientists assumed that human beings, who are constantly exposed to naturally-occurring levels of ionizing radiation in their environment, could receive additional amounts without harm – that there was a “safe threshold” dose. Although cancer and radiation sickness were well recognized as consequences of high doses, the low-level radiation impacts were difficult to discern, due to confounding factors, such as long latency periods, imprecise data, and many variables.

Nonetheless, during those decades, epidemiologists were finding increasingly strong correlations between radiation levels and the incidence of premature deaths (infant mortality), cancers, leukemia, heart disease, mental and other illnesses. (1) In the aftermath of the 1986 Chernobyl accident in the Former Soviet Union, physicians there reported significant increases in childhood thyroid cancers, but also in non-fatal, non-cancer illnesses, especially among the young. These included severity and recurrence of infectious diseases of childhood, gastro-intestinal and respiratory disorders, diabetes, asthma, allergies, chronic fatigue and, in infants, the medical condition known as “failure to thrive.” (2)

In 1990, the National Research Council Committee on the Biological Effects of Ionizing Radiation stated that there appeared to be a linear dose-response relationship but no safe threshold of exposure. (3) The bases of radiation protection were reaffirmed: that no individual should receive additive exposures above background levels unless the benefit to that person was greater than or commensurate with the added risk incurred, and that the informed recipient should be able to choose to accept or reject the added dose(s). For instance, x-rays and other diagnostic and therapeutic applications are used to identify and treat various life-threatening diseases. An informed cancer patient may decide to prolong his or her life with radiation therapy, despite knowing that the risks of subsequent tumors are increased by the exposures.

During the 1990's, advances in research techniques and equipment enabled microbiologists to discern the actual mechanisms of radiation injury at the cellular and molecular levels. Now, a decade later, a number of studies are indicating the nature of these adverse impacts at low doses and low dose-rates. For example, it has been established that internal alpha emitters may have a delayed mutational effect on an exposed cell, wherein the cell reproduces accurately for a number of cell generations before the mutation appears. (4) A bystander effect has also been observed, in which a non-irradiated cell may also be negatively affected by the irradiation that injures a nearby cell.

Currently, research is being sponsored by the Department of Energy's ten-year \$200 million Low-Level Radiation Research Program, which was Congressionally funded to examine “how radiation affects genomes and cells....[and] living organisms.” (5) The DOE's apparent hope was that costs of operation and decommissioning of nuclear facilities might be lowered if low doses were found to be less harmful than the linear hypothesis indicated. The program supports work on such issues as radiation-induced versus normal oxidative damage, adaptive response and cell repair, and genetic susceptibility. However, the DOE is not now sponsoring needed research on genetic damage from low-level radiation, nor on the non-cancer effects, cumulative impacts from multiple sources, or synergistic effects between and among radiation and the many other contaminants to which individuals, of varying susceptibility, are exposed.

The National Aeronautics and Space Administration is sponsoring related research to determine the

impacts on NASA crews of radiation in space, in preparation for expansions of its space exploration program. Progress reports from both the DOE and NASA programs' grantees seem, in large part, to be confirming the validity of findings of adverse low-dose impacts. Among other wide-ranging early results are findings of genomic instability, DNA double-strand breaks that cause cell death or perhaps injury, and the relationship of low-level radiation to the aging process. (6) They raise health concerns.

For the American people, the significance of these research advances in our understanding lies in the precautionary principle: As knowledge of low-level injuries increases, there is a greater need for prudent regulations to minimize radioactive releases into the environment and into the products that people buy and use in their daily lives -- not production of ever more sources of exposures. At a 1999 International Symposium on Ionizing Radiation in Ottawa for the radioactive waste regulators of many nations, there was much discussion of the need also for basic research on the damaging impacts of radiation exposures to biological organisms other than human beings, in addition to far greater focus on the role of synergies between radiation and other pollutants in causing damage to human health and genetic integrity.

1. See, for example: Boardman, D.W., *Radiation Impact*, Center for Atomic Radiation Studies, Cambridge, MA, pre-publication draft, 1992 (Cited with permission of the author); Fairlie, I., and Resnikoff, M., "No Dose too Low," *The Bulletin of the Atomic Scientists*, Nov./Dec. 1997; Gofman, J.W., *Radiation-Induced Cancer from Low-Dose Exposure: An Independent Analysis*, Committee for Nuclear Responsibility, San Francisco, CA; Kneale, G.W., and Stewart, A.M., "Childhood Cancers in the U.K. and their Relation to Background Radiation," *Proceedings of the International Conference on Biological Effects of Ionising Radiation*, London, 1986; Nussbaum, R.H., Kohnlein, W., "Inconsistencies and Open Questions Regarding Low-Dose Health Effects of Ionizing Radiation," *Environmental Health Perspectives*, vol. 102, pp. 656-667, 1994; Wing, S., Richardson, D., Armstrong, D., and Crawford-Brown, D., "A Reevaluation of Cancer Incidence Near the Three Mile Island Nuclear Plant: The Collision of Evidence and Assumptions," *Environmental Health Perspectives*, January 1997, vol. 105, no.12, pp. 2-6
2. Burlakova, E.B., ed., *Consequences of the Chernobyl Catastrophe: Human Health*. Center for Russian Environmental Policy, Scientific Council on Radiobiology, Russian Academy of Sciences, Moscow, 1996 ; personal communication
3. Committee on the Biological Effects of Ionizing Radiations, *Health Effects of Exposure to Low Levels of Ionizing Radiation*, BEIR V. Board on Radiation Effects Research, Commission on Life Sciences, National Research Council, National Academy Press, Washington, D.C., 1990
4. Kadhim, M.A., *et al.*, "Alpha Radiation and Chromosomal Instability," *Nature* 355:738, Feb. 20, 1992; Sedwick, W. D., *et al.*, "Approaches to Detection of Delay Gene Destabilizing Effects of Low Doses of Ionizing Irradiation," (Abstract, 2002) Case Western Reserve University
5. Senator Pete V. Domenici, "A New Nuclear Paradigm," speech at Harvard University, October 31, 1997; "Nuclear Power: The Option for the 21<sup>st</sup> Century," National Academy of Engineering Symposium, Irvine, CA, February 9, 2001
6. Lei Huang, Morgan, W.F., *et al.*, "Genomic Instability and Low Dose / Low Dose Rate Radiation," (Abstract) University of Maryland; Johnston, P.J., *et al.*, "Mechanisms of Enhanced Cell Killing at Low Doses: Implications for Radiation Risk," Gray Cancer Institute, Middlesex, U.K.; "DOE Low Dose Radiation Research Program Workshops, I, II, and III," 2000, 2001, 2002, Washington, D.C.

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