



INTERSTATE NUCLEAR SERVICES

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The Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
Attention: Docketing and Service Branch

OFFICE OF SECRETARY
DOCKETING

Dear Sirs,

The following comments are provided on proposed rule making governing release of radioactive materials to the sanitary sewer system as described in the Federal Register, Vol. 59, No. 38, dated Friday, February 25, 1994.

The issue of discharge to the sanitary sewer system is complex. I can empathize with the difficulty in dealing with the issue, and appreciate the efforts of the Commission to implement a consensual rule-making process. A thorny predicament exists between those in the industry who already feel over-regulated, and the municipalities and anti-nuclear activists who allege that the NRC has failed in its duty to control the release of radioactive material.

Interstate Nuclear Services (INS) serves the nuclear industry from 14 locations situated throughout the United States. Our principle service is the decontamination (laundering) of protective clothing for approximately 80% of the domestic nuclear industry. INS decontamination processes use specialized water-based wash formulations. Water is a vital resource used in INS operations. Depending on the facility, water use ranges from 5,000 to 50,000 gallons per day. Thus, the ability to discharge treated wastewater to the sanitary sewer system is paramount to the Company's ability to continue in business. Further restrictions which limit discharge to the sewer could lead to dire consequences for INS, and in many ways, the entire nuclear industry.

As a preface, I would like to provide a bit of perspective. I hold the position of Manager, Health Physics and Engineering at INS and among other responsibilities, I am in charge of the overall health physics program for the entire company. While I have a fiscal obligation to serve the Company, my principal responsibility lies in the health and safety of our employees, the general public and the environment - a conviction the Company strongly supports. Because of my position, one might anticipate a self-serving resistance to change as would be expected of a licensee that is asked to alter the status quo, or expend significant resources to remedy a situation. However, INS is amenable to change for the good, if it is based on technical reasons. After reviewing government reports and various pathway analyses, and following the issue closely throughout the years, I am beginning to question the motivation behind further restrictions. While I admit that there is evidence of radioactive material accumulation in sewer lines and at treatment facilities (is anyone surprised?), I am hard-pressed to find a health physics-related reason for change. Everything I read seems to indicate that the levels found in sewerage and sludge is of little dose consequence, except when examined using wild and exaggerated assumptions.

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Without question, the discharge of metallic chunks and machining byproducts, or any attempt to circumvent solid radioactive waste disposal by using the sewer must be eliminated. Excepting those situations, where does prudent regulation lie? To what extent should discharge to municipal sewer systems be minimized? Is it based on dose to the theoretical maximally exposed individual? Is it based on an economic level vis-à-vis ALARA and dollars per man-rem saved? Or, is it based on political consensus whereby most parties will be appeased? This fundamental question must be answered before a logical solution can be derived. As a health physicist, I profess that the solution should reside in delivered dose/calculated risk basis. As a businessman, I believe that it should be founded in an economic cost-benefit system similar to the EPA's method of best available technology determination. As an experienced licensee however, (despite the Commission's earnest attempt to the contrary), I fear that the "solution" will emerge as a political resolution, and technical rationale will only surface as a secondary consideration.

In reflecting on the recently enacted change eliminating the "readily dispersible" option, I do not believe that the regulating community "fixed" the problem with a pen-and-ink change to the statute. I strongly suspect that even a perfectly soluble discharge will precipitate upon encountering an increase in pH, or complex with an organic or inorganic compound, or be taken up as a trace element by a microorganism, or plate-out on an inviting surface, or otherwise accumulate by some type of physio-chemical process. Even if this were not to happen by chance, once at the treatment works, the wastewater would be treated with coagulants and flocculants, specifically designed to encourage accumulation of material. Short of zero discharge, material accumulation in the sewer will continue. While zero discharge will satisfy the anti-nuclear factions and nervous municipalities, it will put the industry into an early grave. Therefore, the Commission must establish a decisive regulatory position that will not waver every time someone finds a bit of radioactive material in a sewer.

Encouraging (or forcing as may be the case) licensees to further restrict the form, quantity and/or concentration of radioactive materials in effluent will increase the need for capital and radioactive waste-intensive technologies. There is a point of diminishing returns. Balanced against the real risk from the low delivered dose, the expenditure needed for further abatement of effluents quickly outpaces even conservative figures for dollars per person-rem saved. From the radioactive waste perspective, further effluent restrictions will result in greater radioactive waste production. There is an exponential increase in the amount of waste produced with only an incremental increase in filtering efficiency. Creation of this "unnecessary" waste runs counter to the nation's radioactive waste reduction policy. It also adds to worker dose from additional waste handling resulting in an increase in collective dose. By imposing further restrictions, all that will happen is that the problem will be pushed elsewhere - from the NRC to the waste compacts, but in all cases it will land squarely on the licensee's back and pocketbook. There is a point where it does not make any sense to try to remove decreasingly small amounts of radioactive material - not from an economic view, and certainly not from a dose perspective. I believe that we are already at that point.

In an attempt to specifically answer the Commission's request for comment regarding specific questions, I offer the following. I have repeated [paraphrased] the questions in italics.

1) Form of the Material for Disposal

To what extent and how [should] the regulations take into account the technologies for processing sewage including technologies such as bioprocessing or ion-exchange?

The Commission should consider modifying regulations to reflect the effects of advanced methods of water treatment based on the results of the recently commissioned Pacific Northwest Laboratory study - but only if it is found to be a real factor considering the statistical variation that will be expected in the systems examined. The Commission must also recognize that many of the newly-touted treatment schemes are still experimental, and have not yet proven to be economically-effective on a large scale, and thus may never be employed. Therefore, a "blanket" conservative factor should not be evoked to cover a worst-case treatment method. Instead, the Commission should evaluate the performance of various treatment technologies, and should try to derive a "technology-specific reconcentration factor" for different treatment schemes as compared to several forms and isotopes normally encountered. Using such an adjustment factor would allow a licensee to back-calculate the expected concentrating effects of discharges, and take appropriate pretreatment steps as may be necessary.

[What are] the potential impacts on [your] operations associated with any additional restrictions regarding the forms of materials suitable for dispersal?

The potential impacts of further restrictions on form of materials would be devastating to INS, and likely to the entire industry. At INS, a wide variety of isotopes and forms are processed depending on the activity that the protective clothing was used for. Laboratory and large-scale studies conducted by INS revealed that although the mix of isotopes is fairly constant, there is a diverse array of forms. For example, many isotopes occur in both soluble form (salts) and insoluble form (oxides). Considering the large volumes of water processed, it would be impractical if not impossible to chemically analyze each tank of water prior to discharge. A further restriction in the forms of materials allowed to be discharged (or even the requirement to test for them) would paralyze INS operations and lead to rapid destruction of the Company. Protective clothing is a critical commodity. Most U.S. nuclear power plants and industries have lost or abandoned the ability to process protective clothing. Thus, the loss of INS and similar companies relying on sewer discharge would result in a significant blow to the entire U.S. nuclear industry.

2) Total Quantity of Material

[Is the approach acceptable?]

The approach to limiting total quantity of material is sound but overly simplistic. One would expect that the lower the total quantity discharged, the lower the resultant build-up and dose

delivered. Perhaps this is so. However, I suspect that due to the unique dynamics of each individual treatment system, it will be difficult to find a clear cause and effect. As a suggestion, the Commission should review how many licensees approach the limits, and determine if it results in reconcentration proportionate to the amount of activity being discharged.

[Should] a total quantity to be released be specified or otherwise limited?

It is O.K. to stipulate a total quantity to be discharged as it provides a helpful benchmark to judge against. However, citing the outrageously conservative assumption that an individual receives all drinking water from the discharge pipe, it is relatively safe to say that the present limit is adequate from a dose perspective.

[What about] an approach which might limit the total quantity of each radionuclide, based upon the biokinetics and health risk for each nuclide such as some multiple of the annual limit of intake values, or the related exempt quantities published in 10 CFR part 30?

An approach that may limit the total quantity of each isotope is an approach to split the same hair in a different way. The system of ALI determination already considers biokinetics and health risks for each nuclide so what would change? The ALI approach is on the right track and in concert with the method in use in Europe. Their limits are all based on multiples of ALI. They are more concerned with the dose-related bottom-line. Form, concentration and total quantity are secondary, and are not given great emphasis.

[What] are the potential impacts on [your] operations associated with further restrictions on the total quantity of [each radionuclide] radioactive material which could be released during the year?

The impact on INS of limiting the quantity of radionuclides by isotope would also severely disrupt our ability to operate. While INS could live with slightly reduced isotopic quantity limits, we could not live with the requirement to isotopically analyze each tank prior to discharge. Presently, INS employs a method based on DOT shipping papers to identify a "most limiting nuclide". Gross discharge limits are established assuming that the entire tank contains the most limiting nuclide. This method satisfies a "go/no-go" release requirement. Concurrent with the gross analysis, a sample is collected and compiled into a composite which is sent-out for isotopic analysis for monthly compliance records. If a requirement to measure and limit discharges based on isotopic quantity were enacted, each INS facility would have to be equipped with an entire complement of sophisticated alpha, beta, and gamma isotopically-discerning analytical equipment. Notwithstanding the capital and operating expense of such systems, the time required to process samples between batch releases would be prohibitive, and would severely curtail INS's ability to operate.

[Should] the total quantity of radionuclides that may be released to a sanitary sewer by a licensed nuclear facility take into consideration the capacity and treatment methods used by the water treatment plant that serves the licensee, and should consideration be given to the fact that many licensed facilities may discharge in the same sewer treatment plant?

Consideration should be given to the capacity and treatment methods used by the water treatment plant that serves the licensee. The phenomenon of a large-fish-in-a-small-pond applies in this situation. This problem can be compounded if by coincidence there is an advanced treatment method in use. Review of municipal sewer system capacity and treatment methodology has become an important criterion in the INS site selection process for new facility development. This can and should be employed by the Commission in all future new facility licensing considerations. However, the problem for INS as well as the Commission is that there are a large number of existing facilities that are already in operation that never considered the receiving sewer system. It would not be fair to suddenly "target zone" these facilities out of business. There must be recognition of these cases and if it is a problem when compared to others, then a reasonable time to remedy the situation should be extended.

Consideration should also be given to the fact that many licensed facilities may discharge into the same sewer treatment plant. As a suggestion, the Commission should set rules based on a reasonable number of anticipated users (eg. five) that may be on the same system, then allocate preestablished individual limits to allow each user 1/5 of the total quantity limit. This method is similar to the system of pollutant load allocation used by a municipal sewer system to comply with NPDES limits. I suspect that there are only a few municipalities where the preestablished allocation would be exceeded, (DOE related "campuses" and satellite businesses such as those at Oak Ridge). In these situations, the same methodology could be applied, but it should be done on a case-by-case basis so as not to overly-restrict other licensees.

[What about the Northeast Ohio Regional Sewer District petition to require 24 hour advance notice prior to discharge]?

Don't open Pandora's box! Although a subject of dispute, in my opinion, 10 CFR 8.4, "Jurisdiction over Nuclear Facilities and Materials Under the Atomic Energy Act", does not preempt a municipality from imposing additional sewer restrictions on a permittee. Disposal of waste into the sewer is akin to driving - it is a privilege, not a right. A municipality owns the sewer, and can exercise control over their domain. Carefully worded, a sewer permit can impose an imaginative array of restrictions, and it is not inconceivable that they could require a 24 hour notice prior to disposal of anything, including radioactive materials. Therefore, it would be best to leave this option to the locals. It would be dangerous to mandate that every sewer district require and receive advance notice. Some may not care, some may not be equipped either intellectually or administratively to handle the information, others may prefer to rely on the current system of NRC or agreement state regulation. Moreover, what will happen when a local sewer employee who may not understand the issue decides to "play God"

and hold a licensee hostage by prohibiting discharge? Will the NRC become the arbitrator? Who will bear the cost of lost business? Without clearly established law regarding criteria for limiting disposal, the policy would be ripe for abuse. The NRC does not need to become embroiled in this issue by entering the fray.

3) Type of Limits

Should the Commission continue an approach of limitation based upon an individual being exposed by the ingestion of water from the sewer outfall?

No. Setting regulations based on such an extremely conservative case is one of the reasons that dose calculation models lack credibility. Efforts should be made to recognize a realistic ingestion pathway and use that assumption to set limits. (Realistic models provide at least a one million dilution factor between the discharge point and receptor.) If realism is incorporated however, I believe that the Commission will be reminded that the dose consequences from discharge to the sewer is minimal, and that further limiting concentration or quantity will be unfounded.

Should the Commission consider other locations, such as a treatment facility in determining the level of protection to be provided? If so, what modeling assumptions would be appropriate?

Owing to the uniqueness of every sewage treatment plant, and the differences of every contributor to the system, maybe a retrospective method of regulation should be employed. Perhaps, calculated limits based on point-of-discharge measurements should become secondary, and more emphasis should be placed on the empirical results of the particular situation. One method would be to require licensees to position TLDs at strategic high-potential dose areas at a treatment facility. Licensees might also be encouraged to offer dosimetry and elementary radiation safety training to sewer workers in a cooperative, non-alarming way just as is presently done with local fire and police departments under SARA Title III requirements. The retrospective method would certainly take a lot of the guesswork out the regulating business, and would determine whether or not form or quantity make any difference to the municipal treatment system in question.

Further, how would these types of approaches deal with exposure scenarios such as contamination in sewage sludges, as has been the case in contamination incidents.

Contamination incidents should be handled in a routine way without "panic attacks", fanfare, or regulatory gesticulation. First of all, the Commission should recognize that sewer lines and treatment systems are in fact contaminated to some degree. With the level of analytical sophistication available today, minuscule amounts of activity can be detected. So what? The sewer system is already a restricted area in the sense that free access is not provided to the general public. Entry into the biologically/chemically hazardous confined space is only allowed to specially-trained individuals, and then only on an increasingly-infrequent basis.

While not trained in radiation safety *per se*, sewer workers know to employ good hygienic practices and normally do not come in direct contact with the liquid or solid medium. The greatest potential dose problem is from sludge handling, an area that due to other hazards is carefully controlled. The bigger issue in this scenario is what is an acceptable level of contamination that could be expected (permitted?) to exist in the sewerage system or sludge? This harkens back to the need for a "below regulatory concern" policy. Let's face it, this is another case of diminishing returns. It is ridiculous to dig up a rarely-accessed sewer line, or dispose of thousands of cubic feet of dried municipal sludge, so that it can be re-buried at exorbitant cost in a soon-to-be-extinct radioactive waste repository. Doesn't health physics or reason enter into the picture? What about the real health and safety risks that can result from handling sewer-related materials contaminated with an amalgam of human and chemical waste products? This is the kind of twisted rationale that reminds me to try to understand the Commission's dilemma, but also reinforces my fear that political rather than technical solutions will result to fix the "problem".

Should the Commission consider limitation using a dose limit approach and provide total quantity and concentration values in a Regulatory Guide to facilitate compliance with the dose limit?

I agree that use of a dose limit for compliance would present a realistic approach. It puts the determination on limits back where it should be - based on risk. However, as discussed earlier, the development of such limits would be predicated on a lot of assumptions which must be realistic or else the limits will be as exaggerated as the assumptions. It is presumed that development of quantity and concentration values in a regulatory guide instead of the CFRs indicates that the limits would be guidance but not law. Does this imply that a licensee would have latitude to decide with which method to comply?

I am not against a regulatory guide approach. I recommend that the guide provide "tiered" protocol similar to the EPA's NESHAPS compliance method. If a licensee can comply at the lowest level (the most conservative assumptions taken), then the process stops. If not, compliance demonstration can be taken to increasingly higher tiers whereby there is greater emphasis on site-specific data. This method might well be applied to the sewer discharge scenario and could bridge the gap between absolute concentration/quantity/form limits versus case-by-case regulation.

4) Exemption of Patient Excreta

The Commission invites comments regarding the appropriateness of continuing the exemption for patient excreta.

As a non-medical licensee, I envy the apparent "double-standard" that the medical community seems to enjoy regarding regulation. Somehow, their radioactive material is "good" and all others is "bad". Even the statement in the Federal Register, "Thus, the doses to individuals

from this source are expected to be far below the NRC's dose limit for members of the public" smacks of favoritism. Is theirs the only effluent that results in discharges, "...far below the NRC's dose limit...?"


I recognize that medical waste is of short half-life, but it is conceivable that concentrations at the treatment works and in sewer systems could result in a measurable equilibrium concentration. Again, the decision to exempt excreta should rest on the resulting downstream dose effect, and not because trace amounts of nuclear medicine radionuclides may be found in the sewer. Does the Commission propose to prohibit discharge of excreta or readily dispersible biological material? Not likely. Better to stay focused on promulgating an equitable dose-related regulatory position, then to take on the medical community.

The issue of disposal to the sewer is complex and without a concrete solution. It is immediately threatening to INS, and in many ways, the entire industry. There are alternative methods to measure and regulate discharge to the sewer. However, we must all take our heads out of the sand and admit that radioactivity does exist in the sewer system, and that it will continue to exist. It is a result of the benefits provided by the uses of products by a variety of industries, including the medical community. Perhaps we should work to raise the level of public acceptance up to the current level of practice, instead of lowering the practice down to the current level of paranoia.

In summary, I believe that there can be a workable solution to the discharge issue that may reasonably satisfy the situation without bankrupting the industry. I propose that the Commission put greater emphasis on the actual measurement of resulting sewage treatment plant area exposure rates and sewage sludge concentrations, instead of speculating on the point-of-discharge form, concentration and/or quantity. The empirical measurements can be factored into a dose-based regulation using generally-accepted dose correction factors. If necessary, appropriate measures could then be employed by the licensee to satisfy the established general public dose criterion.

I appreciate the opportunity to comment, and hope that my suggestions and observations are used in a mutually-beneficial way. I would like to extend an offer to assist the Commission in any way possible (task force, workshop, forum, etcetera). As part of INS's proactive position, we have been conducting an array of studies related to the sewer disposal issue. I am willing to share that information where it may be used to supplement the efforts presently being conducted. I can be contacted at the address on the cover sheet.

Respectfully submitted,



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