LETTERS

Radioactivity in the Urals

Colin Norman, in his article "Soviet radwaste spill confirmed" (News and Comment, 16 Apr., p. 274), discusses some of the information in a recent Los Alamos National Laboratory report (*1*) dealing with the radioactively contaminated area(s) near Kyshtym in the Soviet Urals.

We take issue with Norman's conclusion that the Los Alamos "study is perhaps the most convincing explanation so far of what happened near Kyshtym." It is questionable whether "classified" information, which in this case is based heavily on personal accounts from "human sources," is necessarily superior to other types of evidence. We think that the following two examples illustrate our point.

Tumerman's eyewitness accounts were used by the Los Alamos team to support their argument that "acid rain" had devastated vegetation over a wide area near Kyshtym. Tumerman, in a 1976 interview with United Press International (*2*), is actually reported to have said, "I asked my driver why we could not stop and he told me that there had been a tremendous explosion several years before and ever since then it had been like this. On either side of the road there was nothing—an empty, empty land. *There were trees and grass* [italics ours], but where there once were villages and herds and industry there was nothing. Only chimneys remained." Tumerman confirmed his earlier report about the presence of vegetation in an interview with one of our staff in 1978. The full text of the correspondence between Soran and Stillman and Tumerman is not provided in the Los Alamos report.

One of the "human sources" used by the Los Alamos team indicates that he was told that one contaminated area was caused by " . . . a reactor explosion that occurred in 1956 . . . the reactor was named in honor of the famous physics Professor . . . Kurchatov" (*1*). Since the first intelligence "leaks" of classified information on the Kyshtym "accident" involved a major reactor accident (*3*), since a plutonium-production reactor accident explanation was strongly advanced by Sir John Hill (*4*), and because of "other" information (our euphemism for supplemental reports from unclassified "human sources"), we gave careful consideration to this particular case in our previous analyses (*5, 6*). We were particularly concerned about the possibility that Soviet radioecology data might have been censored to conceal just such an event. Yet in their conclusions, Soran and Stillman simply say, "No doubt Kyshtym had its share of small reactor fires when fuel elements, for example, would get hung up during refueling operations"; they neither refute, nor even acknowledge, the previously "leaked" classified sources of information on a major reactor accident.

Soran and Stillman do not appear to use their "classified" information in concert with the available unclassified research. The occurrence of a serious accident(s), including a major plutonium-production reactor accident (as one alternative or additional source of contamination), at the Kyshtym site may then have been taken seriously. We never believed that our earlier inability to identify a suitable mechanism through which contamination from a production-reactor accident could be matched to key Soviet radioecology data sets ruled out at least a partial contribution from such a source (*5, 6*). For purposes of argument we can perform a simple manipulation (assuming a time delay and use of an aluminum filter in beta-counting) of one principal data set involving a group of 13 Eastern Ural lakes that Soviet authors indicated were contaminated by a single aerosol event (*5, 6*) to show how such data might have been censored to conceal a reactor accident. [While this manipulation also permits one to consider a limited array of nuclear weapons accidents, detonations at Novaya Zemlya are specifically excluded (*5*).] However, we also described another set of contaminated water bodies, associated with the drainage of one river, whose contamination appears traceable to a reactor (*5*).

Since we first presented evidence of the "hydrologic isolation" of a large part of the Kyshtym region from the Techa River system [figure 2 in (*5*) and (*6*)], which measures Soran and Stillman suggest were required because of "chronic" contamination, we feel that we have an obligation to elaborate further. The principal issue is not whether chronic releases were responsible for a portion of the radioactive contamination at the Kyshtym site but, rather, what fractions were "accidental" and "chronic" in origin (*5*), respectively. Was the extensive hydrologic isolation system (that is, several large reservoirs and a canal diversion system) built to contain only chronic and "careless" waste discharges, or was it necessitated by a massive overloading of a much smaller system following an accidental release? The latter is more probable. One "other" source has reported the occurrence of a major Soviet reactor accident before 1957 that resulted in the deadly contamination of the reactor's water source.

On the basis of all of the available evidence, at least one major accidental release of radioactivity occurred at or near the Kyshtym site; our research defines the date of one such event to have been no later than the year 1958 (*5, 6*). The Los Alamos team does not dispute the possibility of such an event and, in fact, even suggests one potential mechanism for aerosol contamination from high-level wastes of a "vast area." While we discussed two components of the mechanism independently in our previous work [that is, potential use of earthen reservoirs for high-level waste storage and *chemical* explosions or fires (in ammonium nitrate–containing high-level wastes) in a waste storage site (*5, 6*), the particular association of the two by the Los Alamos team is highly questionable. Moreover, their suggestion about the "vast" extent of the potential contaminated area seems more akin to Medvedev's contentions (*7*) than our own.

We still await release of more information by the Soviet scientific community in order to resolve significant unanswered questions. Whether the word "accident" is singular or plural with regard to Kyshtym is a moot point, but we favor the latter usage based on the most up-to-date information, including that in the Los Alamos report. We believe the potential benefits to the world nuclear community to be derived from Soviet experience in application of remedial measures and associated research are the most important considerations, when one tries to interpret the events at Kyshtym.

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References and Notes

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2. Washington *Post*, 8 December 1976, p. 7.
3. R. Gillette, Los Angeles *Times*, 10 November 1976, page 1; reproduced in part on pages 6 and 7 in (*7*).
4. J. Hill, *New Sci.* **84**, 369 (1979); *Atom* **280**, 46 (1980).
5. J. R. Trabalka, L. D. Eyman, S. I. Auerbach, *Science* **209**, 345 (1980).
6. ———, *Analysis of the 1957–1958 Soviet Nuclear Accident* (ORNL-5613, Oak Ridge National Laboratory, Oak Ridge, Tenn., 1979).
7. Z. A. Medvedev, *Nuclear Disaster in the Urals* (Norton, New York, 1979).

Colin Norman writes that I am skeptical of some of the conclusions of the new study by D. M. Soran and D. B. Stillman (*1*) at the Los Alamos National Laboratory. This is correct. However, I never speculated that the disaster in the Urals was related to a "nuclear explosion, caused by plutonium in waste material which reached critical mass," as Norman writes. In my discussion of the possible role of the residual plutonium in the waste material (*2*), I considered as plausible the similar problem which had developed for the open waste disposal site at Hanford, Washington, and my suggestion was a modified version of the theory from the official report of the U.S. Atomic Energy Commission (*3*). At Hanford the liquid nuclear waste material had been disposed of over many years into the bottomless trenches and the radioactive isotopes absorbed by dry soil. The accumulation of residual plutonium at trench Z-9 reached approximately 100 kilograms in the 1960's. The volume of soil containing plutonium at this trench was approximately 1800 cubic feet. It was calculated that "Due to the quantity of plutonium contained in the soil of Z-9 it is possible to conceive of conditions which could result in a nuclear chain reaction. These conditions would be the rearrangement of the contaminated soil, flooding on the enclosed trench following a record snowfall and rapid melting" (*3*, p. 71). The water-triggered chain reaction could lead to a rapid heat which turns water into steam. The pressure of the steam could produce an explosion, discharging the radioactive soil to the surface. One of the members of the group that investigated trench Z-9 defined this possibility as a "mud-volcano type explosion." In Hanford this possibility was prevented by the removal of the plutonium-rich soil.

However, this type of accident, if it happened in the Urals, is quite different from a "critical mass" nuclear blast. I also considered as possible that the nuclear waste blown to the surface could be dispersed either by snowstorms (during the winter) or by soil (dust) storms (during the spring), which are quite usual for this area. In addition, I suggested some other possible mechanisms of the accident, but neither of them involved the criticality factor.

I also would like to mention that the statement in *Science* (and in the Los Alamos report) that the affected "region was sparsely populated by poverty-stricken people known as Bashkirs, whose chief livelihood was farming and fishing" is not correct. The main population in rural areas between Cheliabinsk and Sverdlovsk is represented by Russian peasants and Ural cossacks (about 80 percent of the rural population of these regions). Among the rather large (and known as prosperous) villages that have disappeared from the maps are Yugo-Koneva, Russkaya-Karbolka, Metlino, Asanovo, Belokataiski, Kuptsovykh, Techa-Brod, and Petrovka; these are typical names of Russian villages. Few Bashkir villages exist in Cheliabinsk region, but they have quite distinct Bashkir names.

Some cases of radioactive contamination in the area around Kyshtym were, of course, possible in the late 1940's and early 1950's. However, all available ecological information, as well as declassified documents from the Central Intelligence Agency, indicate that the large-scale contamination during the winter of 1957–1958 occurred as a result of a single disastrous incident.

In 1979 a group of Los Alamos scientists (including the coauthor of the current report, D. B. Stillman) wrote in *Science* (*4*) that they found it "hard to believe that an area of this magnitude could become contaminated and the event not discussed in detail or by more than one individual for more than 20 years" (*4*, p. 425). I was glad to see that this absolutely unjustified remark has been proved wrong by the same laboratory.

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Argon in Titan's Atmosphere?

Richard A. Kerr's briefing (Research News, 11 June, p. 1210) on the Saturn Conference at Tucson, Arizona, emphasizes the difficulty in accounting for 10 to 12 percent argon in Titan's atmosphere. It may not be necessary to do so, according to a paper presented at the same conference by Gunnar Lindal of the Jet Propulsion Laboratory. He described the results of the first complete analysis of the Voyager radio occultation experiment, showing that argon is not required to satisfy the radio and infrared measurements of atmospheric structure and temperature. While a small amount of argon cannot be ruled out, essentially a pure nitrogen atmosphere with a very small hydrocarbon content is consistent with the data.

Incidentally, the near-surface density of Titan's atmosphere is about 4.5 times that of Earth's—not the reported value of 1.5, which is the pressure ratio.

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Public Meetings

I disagree with a point made by Kathleen Bennett, assistant administrator in charge of the Office of Air, Noise and Radiation at the Environmental Protection Agency (EPA), in her letter (4 June, p. 1046) responding to criticism directed against EPA's lead phasedown program.

In defending her agency's meetings with industry representatives before EPA's February proposal, Bennett indicates that it is EPA's policy to meet with anyone who requests a meeting on matters pending before the agency. So far, so good. She next states that "No one would insist on 'public observers' at all such meetings."

This is not so. At the Consumer Product Safety Commission (CPSC), we have a meeting policy which has been in effect since the agency's inception that requires that all meetings with non-CPSC employees on matters pending before the agency must be open except where proprietary matters are to be discussed or where "extraordinary circumstances" require closure. In my 9 years as a CPSC commissioner, I have rarely, if ever, seen the "extraordinary circumstances" exception invoked.

We insist that meetings of this type be open both because we feel that the public has the right to see its government in action on matters that affect the public and because we want to avoid even the *appearance* of impropriety that closed meetings create.

I pass no judgment on EPA's actions and intend no criticism of its decisions on lead. However, I want to go on record as indicating that other agencies do open their meetings to the public.

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