Call from Mr. Peter Gumbel in Vienna to me in Woods Hole, Saturday July 19, 1991 ca 9:30 to ca 10:30 AM. Later in the morning, he called back, as arranged, for phone numbers of Alex Langmuir and Will Albrink, of which I could find only the former. I should have thought to refer him to Jim Steele (713) 781-3653 and to Phil Brachman (404) 261-2369 as well. Gumbel had tried to reach me earlier this week in Cambridge. He is nearing completion of a 2-year assignment in Moscow as Wall Street Journal correspondent. His telephones in Moscow are 280-5049 (o); 280-0352 (h). Can also be reached through WSJ foreign desk in NYC. Telephone (212) 416-3111, ext 2224 Chay (?) Newton, 200 Liberty Street, NY 10281.

Gumbel went to Sverdlovsk where he spoke with a number of medical, veterinary, and ceramic factory personnel and with victim family members and acquaintances. He also went to a cemetery and a hospital. He has no street map of Sverdlovsk. I promised to send one via WSJ foreign desk in NY, along with other items. The original of the map is at the Library of Congress. He asked if there were written transcripts of the presentations made in the US by Burgasov, Nikiforov and Sergiev. I told him that there are only tapes but he did not ask for them. Gumbel intends to return to Sverdlovsk in the near future. But he is under some pressure to publish soon.

Gumbel cited two articles I had not known:
(1) Kuranty, Moscow, 1 November, 1990, article by or about Yeltsin saying he was kept in the dark about the epidemic.
(2) Uralskiy Robochiy, Sverdlovsk, 12 March 1990, page 3, article entitled "Compound Number 19: Reporters are Rarely Guests There", by S. Bogomolov. Describes visit to the facility with Colonel Kharechko (?), members of parliament, city council and the local academy of sciences including a Dr. Chukonov(?), an environmental scientist. Until 1986, the facility made vaccines for the military. Now they work on methods of area disinfection, protection against biological aerosols, and microorganisms to destroy metal (?) and plastics.

Hospitals. Gumbel went to hospital #20 which was one of the places where the earliest cases were taken but not hospital #40 where all subsequent cases were taken. This may be an unfortunate omission, since the physicians who dealt with the epidemic at #40 may have fuller knowledge and understanding of it, including its duration and the results of extensive autopsy studies done there. Dr. Nikiforov said that the early diagnoses were wrong and that only after he came down from Moscow on April 6 and after the first autopsies was anthrax diagnosed even tentatively and then confirmed on April 10 by bacteriological testing.

Graves. Gumbel visited Vashozny (?) East (?) cemetery. Is it the cemetery marked 13 on my map, just southwest of the city center? I thought I was told that the main burial place for the anthrax victims was west of the city center, but cannot find it in my Moscow or US notes. Could there be two burial places? At the cemetery Gumbel visited, he found metal markers, not stone. The markers were partly illegible. The site where anthrax victims are buried is overgrown with weeds and newer graves are ingressing. He has seen 20-30 markers presumed to be for anthrax victims, but there could be more. He could read dates on several, all early in the epidemic. How early? Are they consistent with the numbers given in my FAS report, which are presentation dates? Where are the later ones? How did he identify the graves of anthrax victims? Is there another site at the same cemetery? Is there a custodian or record keeper who knows or could find out more about dates, names, burial places?

The military biological facility. Gumbel also saw the military biological facility from the outside, noting many buildings inside. His description of the facility and its surroundings agrees with my commercial SPOT photo. It is the facility annually declared by Soviet government under the 1986 BWC Review Conference agreement. He also saw the military installation just south of the facility.

Aramil. He did not say and I neglected to ask whether he visited the factory or slaughterhouse said to have produced the contaminated blood and bone meal, at Aramil ca 15 km south of Sverdlovsk.

Residence clustering. The Soviet physicians said that about 70% of the cases resided in the southern part of the city and its southern suburbs, and 30% in the northern part of the city. The facility is near the southern limit of the city, with apartment complexes to its east and mainly open areas to its west, according to SPOT. Gumbel located the residences of (how many?) victims. How did he do this? These cluster in a region east of the military biological facility near the southern edge of Sverdlovsk. The US explanation is that there was a release of spores from the facility when the wind was blowing southeast. According to Sverdlovsk airport records covering late March and early April 1979 the wind often took this course, although not at all constantly. None of the published USG accounts state just when the alleged release took place. The Soviet physicians attributed the clustering to the locations where contaminated meat was put on sale in "private" markets, after illegal butchering outside the city. The residence clustering does not discriminate the two explanations.

The ceramic factory. The Soviet physicians said that a substantial number of the patients worked at a big ceramics factory with ca 3000 workers in the southern part of the city. They said that several, I recorded 15, cow carcasses were delivered to the factory on April 8, before the cases developed. They said that at least one

was suspected of being contaminated because the animal had been sick. Gumbel spoke to a ceramic factory canteen employee (?) who said no carcasses were proven to be contaminated. Sergiev may know more about this and about the reliability of any bacteriological tests that were done, since he was involved in such testing in the case of a cow carcass thrown in a well and subsequently tested positive for bacillus anthracis. The other view is that the presumed spore cloud passed over the factory during working hours. Again, no clear discrimination between hypotheses.

Household clusters. Gumbel wondered why there were few if any within-household clusters. The Soviet physicians told me of only one instance, a woman and her visiting boy-friend, both of whom died. In a different case, three persons who butchered an infected sheep got cutaneous anthrax. But the rareness of such clusters is unremarkable on either the ingestion or the inhalation hypothesis, owing to the likelihood of a wide distribution of dose and of susceptibility. The latter goes back to the Koch-Pasteur controversy over whether or not intestinal anthrax occurs in sheep! Koch thought not, because he found that sheep intubated with anthrax remained healthy. Pasteur proved him wrong by showing that intubation with anthrax plus pulverized thistles caused anthrax even though intubation with anthrax alone did not. Damage to the intestinal tract rendered the sheep susceptible. In humans, alcohol damage, ulcers, bleeding polyps, etc. might favor infection. As for inhalatory anthrax, there is epidemiological evidence from industrial outbreaks suggesting considerable variation in individual susceptibility. Again, no real discrimination between the two hypotheses.

Sex distribution. I do not recall much discussion during the phone call about sex and age distribution. Dr. Bezdeneznykh said that 2/3 of the 76 cases for which he presented data in 1986 were males, all adult. He left Sverdlovsk on April 30. He thought this tendency reflected greater meat consumption by men. Maybe. It is not implausible that men eat twice as much meat as do women. Alcohol damage to the GI tract, almost certainly more common in adult Sverdlovsk males than in women and children, may be a factor. But there are too many variables that could affect sex ratio for such speculation to be worth much or for the excess of males to be evidentiary with respect to the two hypotheses.

Age distribution. Can Gumbel confirm statements by the Soviet physicians that there was only one child among the 96 anthrax patients, a 6-year old girl who survived? All the other patients were said to be 20 or older. Why were so few children affected? Dr.Bezdeneznykh thought on the basis of his household survey that it was because most of the meat they eat is in schools and day care centers, where inspected meat is served. One might speculate that their GI tracts may be in better shape -- could lack of alcohol consumption be involved here? It would be good to know more about the age distribution in the region where victims resided and about

the daily movements of children. At present, I know of no obvious explanation for such a skewed age distribution on the inhalation hypothesis.

Duration of epidemic. I stressed a fact agreed by the initial anonymous press reports, the US government and the Soviet physicians and confirmed by Dr. Olga Yampolskaya from her experience with anthrax patients in the intensive care ward at Hospital #40: new cases continued to come to hospital and deaths continued to occur for weeks. I explained that such long duration would not be expected for inhalation following exposure to a passing cloud. The cloud would be borne by the wind. Only a small proportion of spores would impact on the ground or other surfaces in the city area. Even these would not resuspend as micron-size particles, as required for inhalatory infection. Consequently, inhalatory infection would be confined to direct exposure to the passing cloud, lasting no more than hours. Since the mean variability of the interval from infection to illness or death is only a very few days, the hospital admissions and deaths would be expected to occur within a brief period, say less than a week. According to Dr. Bezdeneznykh, there were at least 4 new cases per day for the first 12 days and then a total of 22 more cases until the last one on the 46th day. Yampolskaya will know about the presentation of new cases at least until the day she left, I think April 30. So long-lasting an epidemic, even with initial clustering, is not expected to result from a windborne cloud. Secondary exposure via human consumption of meat of animals infected by inhalation seems an unlikely explanation for the long duration. (Since any such hypothesis postulating secondary contamination of food supplies would require numerous ingestion cases, medical or other informants claiming no knowledge of gastrointestinal cases cannot be fully authorative -- the dog that did not bark!)

Clinical and autopsy evidence. I explained that attempted distinctions between the inhalation route and the ingestion route based on clinical observations could easily be wrong. While no physician, let alone one experienced with both kinds of human anthrax (there may be none in the West), I understand that the toxic shock in both cases has similar clinical manifestations, including shortness of breath, liquid in the lungs and cyanosis. The distinction between the two routes of infection is most reliably made on epidemiological and pathoanatomical, not clinical grounds. As for autopsy evidence, I said that differential examination of mediastinal (draining the lungs) and mesentery (draining the intestines) lymph nodes should distinguish the two routes, especially if severe damage is not too widespread. Dr. Nikiforov showed numerous pictures of hemorrhagic and destroyed mesentery nodes and focal and diffuse intestinal tract lessions apparently from a number of individuals and said that the severity

of damage tended to increase with the duration of illness before death. The mesenteric nodes were most typically affected. In some victims, however, the damage was so widespread that even the brain was destroyed ("Cardinals Cap"). In one such case with brain damage, Dr. Nikiforov said, according to my notes, that there was also damage to mediastinal nodes. The slides he showed convincingly portrayed gastrointestinal hemorrhagic pathology. If they were typical of all the deaths, that would settle the issue. Dr. Nikiforov said that all 64 who died were autopsied. I believe that Dr. Yampolskaya was present at most of the autopsies.

Overall conclusions. I expressed my view that the explanation of the Soviet physicians is very plausible, both internally and in terms of what is in the Russian and world literature about anthrax. And it does better than the inhalation hypothesis in explaining the near absence of children and the long duration of the epidemic. The autopsy slides are also supportive. Aside from the separate pieces of evidence, the internal consistency and scientific plausibility of the detailed accounts given to me and others in many hours of informal give-and-take conversation in Moscow and the US with Drs. Bezdeneznykh, Burgasov, Nikiforov, Sergiev and Yampolskaya strongly indicate that their statements regarding fact are essentially true and that their explanations and speculations are honestly given. My overall conclusion therefore is that the epidemic was caused by ingestion and skin contact, not by inhalation.

Granting this, however, the epidemic would simply be non-evidentiary as to the nature of the past and present activities at the military biological facility. That is still unclear.

We discussed the never-completed study of the epidemic by the deceased son of Dr. B. and the slides in the possession of the physician son of Dr. N and several other things but the above is my recollection of the highlights of my conversations with Gumbel, together with additional observations.