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Uranium pollution from the Amsterdam 1992 plane crash

A year after an El Al cargo jet crashed in Amsterdam on October 4, 1992, in which 43 people were killed, the LAKA documentation and research center on nuclear energy in Amsterdam announced that the plane contained counterweights made of depleted uranium (DU)[1].

(463.4609) Henk v/d Keur -This news considerably upset residents of the Bijlmer suburb (Amsterdam Southeast) who were suddenly confronted with information that the authorities would rather have kept silent about. Even today, many details of the cause and effects of the disaster remain unclear.

It is known that the destroyed Boeing aircraft had on board 75 tons of kerosene and 10 tons of chemicals, as well as flammable liquids, gases, and caustic substances. We know now that half of these materials, as well as a large amount of depleted uranium, went up in a sea of flames. The presence of DU on board the plane is based on a publication by Paul Loewenstein,[2] then technical director and vice-president of the American company Nuclear Metals Inc., the supplier of the DU to Boeing. Loewenstein says in this document that each Boeing 747 contains 1,500 kilograms of DU in the form of counterweights. Other publications explain that these internal parts for flight control are also found in the tail rudder and the wings.[3]

Health Risks

In a press statement, LAKA pointed out emphatically that bystanders and Bijlmer residents ran potential health risks as a result of airborne uranium from the burning wreck. Loewenstein says in his article that "large pieces of uranium oxidize rapidly in a long-lasting fire whenever they are heated in the air to a temperature of about 500°C". The great danger from this chemical reaction is that the escaping cloud of dust with thousands of microparticles of uranium oxide can be inhaled or swallowed by bystanders. The American physicist Robert L. Parker wrote in *Nature* [4], in a worst-case scenario involving the crash of a Boeing 747, that about 250,000 people would run health risks (or near-poisoning) as a result of inhalation or swallowing of uranium oxide particles. Parker's conclusion assumed the presence of 450 kilos of DU in a Boeing 747. He says: "Extended tests by the American Navy and NASA showed that the temperature of the fireball in a plane crash can reach 1200°C. Such temperatures are high enough to cause very rapid oxidation of depleted uranium."

Deception

To calm troubled minds in the Bijlmer area, the radiation expert A.S. Keverling Buisman of the Energy Research Center ECN) issued a press release [5] the same day that the news of the uranium contamination swept the world. He confirmed the presence of DU in the wrecked plane, but denied any hazard to public health or the environment. A day later, the same expert spoke in the town hall in the Zuidoost (Southeast) district, where the Amsterdam Research Service on Environmental Protection and Soil Mechanics (Omegam) presented a definitive version of its investigation on the polluted soil in the immediate surroundings of the flats named Kruitberg and Groeneveen where the plane crashed. Throughout the hearing, Keverling Buisman was pressed to answer all kinds of questions about uranium, and to calm the uneasiness of the Zuidoost population.

Neither the Zuidoost council nor the Amsterdam Environmental Service nor Omegam was aware at that time of the extent of the presence of DU in the accident. The clearly nervous radiation expert did not convince the neighborhood people that uranium carried no risks. The

Bijlmer working group on Air-Traffic and associated neighborhood groups like Service Platform and Sounding Board were already in possession of a variety of documents in which it was clear that depleted uranium in a jet fuel fire is definitely harmful to public health and the environment. The district council had obviously not grasped the message from the information, because in cooperation with the ECN the next day (October 14), a letter [6] was carried door-to-door with the advice that all was well and that there was not a single reason for concern: "It is possible that recent publications on the presence of uranium-bearing materials in the unfortunate plane crash have led to unease among neighborhood residents. The concern is misplaced. From the information of the National Airline Service it was already known that depleted uranium metal is used as a ballast in airframes. About 400 kg of uranium metal was incorporated into the unfortunate Boeing plane for this purpose. The uranium metal was simultaneously removed with other fragments from the plane crash in the week after the accident. Uranium metal is not dangerous to the public health. The surrounding effects were therefore not influenced by the accident."

In a letter from J. Cleij, director of the Amsterdam Environmental Service, to P. J. Castelijn, head of public works in the Zuidoost district, it appeared, however, that this view was not completely shared [7]: "The reassuring conclusion of this radiation expert (Keverling Buisman) concerning the risk that the block of uranium/tungsten carries for the public health (radioactivity and toxicity when taken into the human body) were fully underwritten by the Environmental Service. The Environmental Service truly does not underwrite the conception that -in view of the reassuring remarks of the radiation expert -- further basic research into these two metals is not necessary. The melting point of uranium metal is 1132°C. The temperature of the fire (estimated between 1000° and 3000°C) is very uncertain. It is nevertheless conceivable that the uranium/tungsten block in any case was melted and in the surrounding thermal updraft and in extreme circumstances spread to the surroundings."

It is striking that the director of the Environmental Service, just like the ECN radiation expert, is so exclusively concerned with the melting point of uranium. He says nothing about the dangers associated with the so-called pyrophoric character of metallic uranium. It is precisely this quality that the greatest danger of uranium is hidden. Uranium belongs to the class of pyrophoric substances, which means that, in small particles, it will burn spontaneously in atmospheric oxygen to produce uranium dioxide. In the case of shards of uranium, the surfaces of the metal at high temperature will undergo a similar process. This is the "rapid oxidation" that Loewenstein and Parker have discussed.

Falsehood

Spokesmen for Boeing, El Al, the Dutch Ministry of Traffic and Water Supply, and the National Airline Service (Rijksluchtvaartdienst, RLD) admitted immediately that there were DU counterweights in the tail rudder of the ill-starred aircraft. But nothing at all was said about the presence of uranium in the wings of the plane. Also, they claimed that the plane contained 380 kg of DU rather than 1,500 kg. El Al declared that during the construction of the plane, 45 kg of a total of 425 kg of DU was replaced by tungsten.[8] In his press release of October 12, Keverling Buisman announced that the uranium "block" remained intact. The same day, the Ministry of Traffic and Water Supply declared, however, that blackened "remnants" were put into storage.[9] The total surface of the uranium was thus much greater than that upon which Keverling Buisman had based his theory. The comforting declaration of the radiation expert thus became less convincing. Paul Loewenstein said that the totality of DU would become particles in a fire, depending on the following factors: temperature, the surface condition of the fragments (a measure of the accessibility of the metal to surrounding oxygen), and wind speed. This means that the weather at the time of the Bijlmer crash was conducive to the dispersion of burning uranium and that there was every reason for concern. The temperature of the jet fuel fire apparently went higher than 500°C, the minimum

temperature for the likely combustion of the outer surfaces of the DU fragments. Moreover, there was a strong northwest wind blowing at the time (windspeed 7). People should have been concerned because a big part of the uranium in the form of dust clouds could have spread across the area, especially towards the southeast. It is known that dust particles can be blown by the wind for kilometers.[10]

Silence

As early as June 1993, LAKA had indications that the 747 carried DU. A LAKA staff person had found a news article concerning an air crash at Tenerife in the Canary Islands in March of 1977 when two Boeing 747s crashed.[11] A Spanish representative of the Boeing company says in this article that the 747 contained about 310 kg of DU in the tail rudder. The reporter added that "in Seattle, a Boeing spokesman said that 'for some time' non-radioactive uranium had been used in the tail rudders and wings of the 747".

At about the time that this article was discovered, an interesting article by Vincent Dekker appeared in the newspaper *Trouw* about the secret disappearance of the complete tail rudder (and the flight recorder) of the El Al Jumbo plane in the early morning following the Bijlmer disaster.[12] For the article Dekker interviewed Henk Prijt, a Bijlmer resident. At about 5 o'clock in the morning Prijt discovered that emergency crews were already working on the crash site. "About 20 people in white suits searched the rest of the Jumbo. According to Prijt, they were carrying away a lot of plane fragments. An agent doing surveillance told Prijt that they were Israelis." They were working in a big hurry and by the end of the morning they were finished. The reporter continued: "At about 6 o'clock in the morning we could also hear the trucks coming and going. Probably a lot of material was carried away which was not seen by the outside world, and especially the media. It must have been in this hour that the flight recorder was put with the other parts and carried to Schiphol airport -- if really it happened this way." Henk Prijt's declaration was confirmed by other onlookers and was proven by a photo which *Trouw* bought from the Amsterdam Police Department. This photo, taken at about 7 a.m., shows that where there should have been an enormous mountain of discarded metal, nothing was left.

Proof

Loewenstein says [13]: "Counterweights are used in the aerodynamic controls of planes, rockets, and helicopters to maintain the aircraft's center of gravity. Heavy density is important in keeping the counterweight small in comparison with airfoil steering surfaces. DU is very appropriate for this kind of application, and uranium counterweights are used in many civil and military aircraft." The report mentions as an example the Boeing 747, a plane which, according to its supplier, contains 1500 kg of DU as a standard amount.

Directly after the announcement of DU in the accident, Boeing, as noted above, stated that there was only 380 kg in the tail of the plane. In *Trouw* (December 3, 1993), an RLD spokesman later admitted that there was also DU in the wings, although the total amount, according to him, stayed at 380 kg. A staff member of the Hazardous Materials Service of KLM Airlines also said that large quantities of depleted uranium are found in the wings of a 747.[14] In the same article, an El Al spokesman said in the same article that "the standard quantity of uranium was found" in the crashed Jumbo jet, but he did not know the amount that the Boeing company had announced. El Al denied that there was any uranium in the wings at all. Boeing had earlier said, just as KLM had, that it had not used any DU in the wings in ten years. The 112 kg of DU retrieved from the crash by KLM was transported by way of the Petten nuclear center (ECN) to COVRA, the Dutch national agency for radioactive waste management. COVRA does not want to say how much DU was delivered.

False Promises

On November 5, 1993, the then Minister Alders of Environmental Policy (VROM), answering

parliamentary questions put by a MP, Mr. van Gijzel, said that the burned cargo and the DU release were no danger to the public health and the environment. Of the 385 kg contained in the tail, 112 kg went into storage after the accident, so that officially 273 kg from this source was still missing. Alders wrote to Parliament that the damage to the environment was caused mainly by the burning and dispersion of the 75 tons of fuel. Research conclusions stated that there was serious soil pollution 80 to 100 meters from the center of the crash site. Further, Alders announced that there was no research which showed that there was any danger for people who were absent during or after the crash. Also, after knowing of the presence of hazardous materials and radioactivity in the air, fire crews would have taken protective measures. But there is no evidence that these hazards had been found at the time.[15]

A week later, chairman A.J. Bos of the Groeneveencer quality of life commission announced that the firemen did measure the presence of hazardous materials and radioactivity right after the disaster, but that they had no special equipment to measure the presence of DU particles in the air. At the same time, the Environment Service announced that further investigation of the dispersed DU was necessary. The search that took place was not very useful. On December 27, 1993, F. Otten of the Omegam research service declared that soil samples which were taken earlier that year to inspect for chemical pollution, did not contain any DU. According to the researcher, this not very surprising conclusion had already been assumed before the analysis of the soil features because a surface layer of 40 centimeters had been removed from the area. The heavily polluted soil was taken to an Amsterdam depot.[16] During a commission meeting of the Zuidoost District Public Works department on January 18, 1994, district chairman R. Jansen promised a medical research project involving the police and volunteers who were present after the crash. Also, that the soil should be inspected for the presence of uranium.

About 48 kilograms of DU was found on February 7, 1994, during a closer inspection of part of the wreckage which was deposited at the Schiphol Airport. So the total missing amount of DU since then is 225 kilograms.[17] On September 13, 1994, the Amsterdam Health Service (GG en GD) declared that effects on the health of neighbors by the DU are "unlikely". In a letter to the city council of Zuidoost, the Health Service wrote: "The complaints which were put forward by a group of residents were not such as these that a relationship was acceptable with the plane crash." The physicians of the municipal service based this conclusion on information of family doctors in this part of the city and on declarations of industrial doctors. Additionally they mentioned that the service personnel who were thrown into gear for the rescue work had also experienced no disadvantageous consequences. Even when small particles of DU oxides have been spread by burning, the Health Service said, nobody would run any risk to inhale or to ingest the radioactive particles, because "the airstream is always directed to the seat of fire."[18]

The "research results" of the Health Service made part of the final report on the DU by the city council of Zuidoost, published on October 4, 1994. On a public hearing about this report, LAKA made many critical comments on the function of the National Airline Service (RLD), the city council and Environment Service of Zuidoost and the Amsterdam Health Service. Especially the last service had to pay to it. LAKA called together the Bijlmer residents and the Dutch Greens for a long-term in-depth epidemiological search for the presence of uranium in the bodies of the service personnel and residents and for a new research to examine the presence of DU in the soil and the ground water.

Since the publication of the final report from the city council, which strongly played down the health and environmental effects of DU, LAKA obtained more and more documents which strongly emphasized the chemical and radiological toxicity of DU. The most interesting one in this particular case is probably the report "Health risks during exposure of uranium", made by radiation expert Leonard A. Hennen from the Dutch Ministry of Defense. By accident, this

report was published just a week after the final report on DU from the city council of Zuidoost. The author is very thorough about the radiotoxic nature of DU in the human body. The findings of Hennen strongly contradicts the findings in the final DU report of Zuidoost. He said that the people at the crash site are running risks. In his report (chapter 5, p. 9) he proposes the taking of urine samples and "in vivo" measurements when there is suspicion of internal contamination of the DU. This is exactly what we insist upon, but it has not happened until today.

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Notes

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3. See notes 4, 11, 13, and 14.
4. Parker, Robert L., "Fear of Flying," *Nature*, Vol. 336, 22/29 December 1988.
5. Keverling Buisman, A.S., "Depleted Uranium-Metal: What is It?" ECN-Radiation Technology, Petten, 12 October 1993.
6. Letter to the residents of Kikkenstein, Kruitberg, Groeneveen, Gooioord and Kleiburg, of the Zuidoost district of Amsterdam. Subject: Soil pollution from the plane crash at Bijlmer Lake. Amsterdam, 14 October 1993.
7. Letter from Environment Service Amsterdam. Subject: Soil research Kruitberg/Groeneveen. 1 November 1993.
8. Among others, *Nieuwsblad v.h. Noorden, Parool, PZC, Volkskrant, and Gazet van Antwerpen*, 13 October 1993.
9. *Trouw*, 13 October 1993.
10. See Uranium Battlefields Home & Abroad, p. 35.
11. Gooi and Eemlander, 29 August 1977.
12. Dekker, Vincent, "Black Magic around a black box", *Trouw*, 26 June 1993.
13. Uranium Battlefields Home & Abroad, p. 136.
14. "RLD searches for uranium on the crash place", *Trouw*, 3 December 1993.
15. "No poisonous materials in cargo El Al plane, but indeed depleted uranium in the tail", VROM Press Release, 5 November 1993.
16. "Uranium still missing from El Al plane after 'unnecessary' search," *Trouw*, 28 December 1993.
17. "Little part of missing El Al uranium found", ANP (Dutch Press Service), 7 February 1994.
18. *NRC Handelsblad*, 13 September 1994.