

Broken Arrow --

The B-52 Accident

On 21 January 1968, a SAC B-52G crippled by fire and carrying four B28 thermonuclear weapons -- with a reported yield of 1.1 megaton each -- made a beeline for the safety of Thule Air Base. It did not quite make it. The plane over flew the base at low altitude, permitting six occupants to bail out, while the stricken plane -- with one unfortunate crewmember who was less an ejection seat -- crashed onto the sea ice of North Star Bay seven miles to the west of the base. This "Broken Arrow" condition set into motion a huge effort to recover the bombs, or what was left of them. The effort involved all the U.S. and Danish assistance that could be mustered at the base itself, and also massive specialized help from the continental United States.



The Stratofortress was on a Thule Monitor mission, meaning it orbited the Thule area within UHF radio range in order to verify if a Soviet attack occurred at the base. These highly classified missions were routine, but did at that time carry nuclear weapons in order to maximize retaliatory efforts in case of attack. The bombs require an extraordinarily complicated sequence of actions before they can be used. Scott Sagan, in the book *The Limits of Safety*, has an excellent discussion of the accident and its significance. The most positive result of the accident was the discontinuance of

airborne alert. Only two years earlier, in a more highly publicized accident, another four bombs had been lost at Rota, Spain, and now it finally dawned on the leadership that these types of missions could not be justified during times of non-elevated tension.

The B-52G, from 328 Bomb Squadron, had originated at Plattsburgh AFB. The captain's name was John Haug; the copilot was Leonard Svitenko. Unusually, a couple of majors were on board; possibly for purposes of navigation training. At any rate, one was "extra" in so far as the normal B-52 crew complement was concerned. The G model had an aft gunner, but he was equipped with an ejection seat. To remain within radio range, the big bomber made a turn back towards Thule about ninety miles magnetic south of the base (which is inland, and about twelve minutes flying time out) and it was then that smoke was detected in the navigator's compartment. By then, the jumpseat passenger had been invited to fly in the right seat, while copilot Svitenko went down to rest.



The smoke came from a malfunctioning cabin heater, and it resisted all attempts to be extinguished. Haug naturally cut engine power and descended in order to reach Thule.

The fire in the cabin finally cut off electrical power, and when the lights of Thule appeared ahead a few minutes later, the fire became too intense to allow controlled flight, so Haug ordered the evacuation of the plane. Svitenko was told to make it out the hatch, but apparently his path was blocked by the flames. He died in the ensuing crash, whereas the remainder of the crew drifted down over the base area with only slight injuries. The doomed aircraft, which logic suggests was deliberately aimed at the sea ice beyond Thule, continued to descend until it impacted and exploded around five miles beyond the Thule port area. Those who recalled the event (and did they ever) said everything and everyone on base jumped when the shock wave arrived about half a minute after the crash.

There were a number of direct witnesses, including Eskimo dog-drivers and the Danish radio operator at Dundas. They reported finding only random smoldering pieces on the blackened ice. Their K9-powered mobility was extremely useful to the base commander, since the base had difficulty-finding equipment, which could navigate the sea ice safely.

Crested Ice -- The Clean Up

There are few episodes in the history of our present topic which shine more with determination, ingenuity, creativity, skill, and hard work, as well as with the spirit of bilateral cooperation, than Operation Crested Ice. It was a race against time to clean out the crash site before the sea claimed the debris. It is then doubly tragic that in recent years, this operation has become an occasion for backbiting, lawsuits, and fervent attempts to drive a wedge between the United States and Denmark.

Immediately as word of the crash reached SAC headquarters and the Pentagon, contingency plans went into operation all over the United States. These meticulous plans involve the services of dozens of agencies and departments, civil and military, and requisition people, equipment, and aircraft previously tagged for just such a disaster. Eyewitnesses stated that within a few hours, a veritable air bridge of supplies from the States started winding its way to the otherwise tranquil base. Over seventy agencies were ultimately involved, and right from the beginning experts from the Danish nuclear research agency were flown up to participate in and monitor the operation.

The commander of the cleanup was Maj. Gen. Richard Hunziker of SAC's Materiel Command. He arrived in the forefront of a detachment of experts that would eventually number in the hundreds. At first, they concentrated on mapping the crash site, locating the hot spots with Geiger counters, and planning the removal operation. But their first priority was to locate and safeguard the radioactive material of the fissile cores, reputedly weighing at least a couple hundred pounds.

(It is not publicly known how much of the weapons-grade plutonium was involved; the yield of the weapon is primarily from the hydrogen isotopes, which are not as persistent or dangerous. The amount of plutonium has given rise to much speculation. Obviously it would be beyond the critical level, a few pounds, but need not be more, although it is not clear what might have been used to boost the yield. Plutonium decays through alpha emission and is only dangerous if aspirated. But breathe the slightest amount, it is said, and you can count on getting cancer years later.

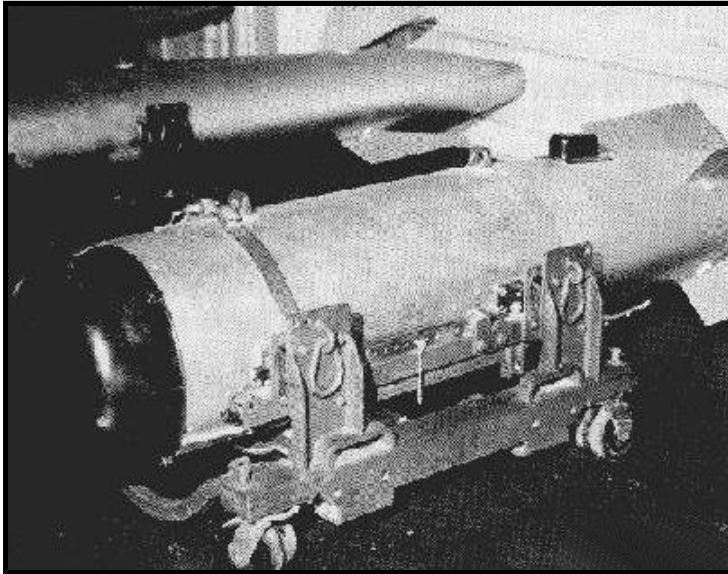


Thus the problem rests with any portion that was dispersed as an aerosol. Studies claim that would have been a very small amount, but reason suggests that the first visitors on the scene, who also did not have protective gear, might have been most exposed to airborne particles. It is said that nearly all the plutonium was picked up after it was encased in refrozen ice, and the remainder sank to the bottom. Any aerosol would have blown out over the frozen sea within the first hour or two, during the fire. It is claimed the "cold" material is too stable to re-contaminated air.

One of the "benefits" of crashing at Thule was the prolonged and continuing scientific monitoring by competent and meticulous Danish nuclear scientists. Recent surveys show no elevation of plutonium in the sea, although debris remains on the seafloor. Also, those workers who present with ailments do not necessarily have cancers, as expected, but various other diseases. Depending on who you ask, cancer rates are now slightly elevated or not. It should also be considered that other factors surrounding the clean-up might have affected health, although how is speculative.)

Experts report that the B28 weapon weighs 984 kilograms, has a length of 421 centimeters (about twelve feet), and a diameter of 51 centimeters. (There were different versions of the device, and such data is sometimes deliberately incorrect to better track where it winds up. This description is from John Clearwater's encyclopedic Canadian Nuclear Weapons.) The physics package consists of plutonium, lithium-6-deuteride, and tritium, while the trigger is a package of high explosive employing a forty-point detonation system. Thus, the devices are of substantial size as well as fiendishly intricate - but with a comparatively small amount of high explosive embedded.

B28



B28IN (main Thud nuke) in front,
B28RE (external carry) in rear

- **Width:** 20 or 22 inches
- **Length:** 96 - 170 inches
- **Weight:** 1,700 - 2,320 pounds

Yield(s):

- Mod 1: 1.1 mt
- Mod 2: 350 kt
- Mod 3: 70 kt
- Mod 5: 1.45 mt

Delivery Modes: High altitude freefall or retarded (parachute), airburst or contact, low altitude laydown(B28FI only for SAC B-52s)

Status: The W-28 small diameter, light weight ("Class-D") thermonuclear warhead in this bomb became the most versatile and widely used design ever adopted by the United States. Produced 1/58 - 3/58, 8/58 - 5/66; retirement of early B28 models began 1961, last model retired 9/91

The bombs, which are not fully armed and assembled until their deliberate use is imminent, did not "go off." But despite safeguards against this, the conventional triggers detonated in the fire without starting the fission-fusion sequence. Some reports have it that the weapons were found attached to their opened parachutes, which may have deployed prior to impact, but more likely ejected spontaneously when the triggers activated in the impact. This still left a mess of radioactive plutonium, depleted uranium, and tritium in the midst of a fire burning into the several feet of snow and sea ice. This called for not only cautious fire suppression efforts, but thereafter a massive clean-up of everything contaminated, including the snow and ice. The biggest effort would be the transportation of debris and material deemed too radioactive to be left in place back to special repositories in the United States. This material would have to either be flown out, or stored until July when the ice broke up and ships could take it out.

The sea ice is generally three to six feet thick and thus would have initially contained the immense fireball from the burning kerosene. The sea bottom is at about 700-1000 feet in this area, and any material that dropped to the bottom would be recoverable by standard submersible means. However, the radioactive material that rose with the fireball into the atmosphere could naturally not be recovered. Although I have not seen the meteorological records from the time of the incident, the crash happened at a time of year and during weather conditions that are almost always characterized by a gentle down-slope wind from the ice cap. The storm that arose later would also have blown out to sea -- there are few wrong-way storms at Thule. Therefore, the initial atmospheric contamination almost certainly would have dissipated harmlessly.

The participants in the clean-up included nearly everyone on base, even Eskimo sled drivers and Danish civilians from Dundas -- all of whom should have received due recognition for their efforts. About two thousand people took part, of whom about twelve hundred were Danes. However, the American servicemen were reserved for the more exposed tasks, i.e. picking up by hand the radioactive material now encased in the snow and ice. The Danes were used for transportation and logistics. Thanks to the contingency plans, protective clothing, decontamination devices, and radiation monitoring equipment were quickly made available. The policy was that "nothing higher than a reading of zero was considered satisfactory for any except American personnel," while "for our own people,

normal Department of Defense standards were accepted." It is unrealistic to assume that this could have been achieved with total certainty, but follow-up results indeed did indicate that Danish workers had not been jeopardized. Obviously, the policy had security concerns as well as diplomatic kindness in mind.

A small city complete with barracks, phase huts, and specialized vehicles arose on the ice in the vicinity of the crash. It became known as Camp Hunziker; it protected crew from the other more immediate risk, that of freezing to death or wandering off in a white-out. The more insidious danger of radiation was primarily focused on the plutonium remnants, which are extremely dangerous if ingested, but otherwise comparatively harmless.

The ingenious ice and snow decontamination operation involved the use of disconnected, abandoned 25,000-gallon POL (petrol/oil/lubricants) tanks. As the *Thule Times* reported it, the Danish workers hauled them to Hangar Two, where they were cleaned and welded shut except for openings for snow loading. Then the contaminated snow was hauled from the crash site and deposited inside the sixty-seven tanks. All in all, three square miles of snow cover, eight thousand cubic yards in all, 10,500 tons, went into the tanks, which were then sealed shut. Other debris from the crash was similarly handled.

The crash site was then spread with black carbonized sand in order to promote early melting. The containment tanks themselves were also painted black to absorb solar radiation. An attempt to use plastic greenhouses to melt contaminated snow and ice was tried, but the structures blew away in the first phase condition. Not until July could the material, now melted, be shipped to the Atomic



Energy Commission's Savannah River Plant in South Carolina, where the low-level radiating debris was finally deposited in underground tanks. The last ship with debris left on 11 September 1968, the last tank fittingly emblazoned with a "That's all folks!" in yet another American tip of the hat to the cartoons.

During August, scientists from both countries employed a 54-foot motor launch and a 24-foot mini-submarine to conduct radiological surveys of the crash area and its surroundings. Apparently the results were satisfactory, since the material had by then melted and dissipated in the fjord. However, reports recently released (1995) have mentioned a search for components, which appeared to have eluded (at least early) detection. This has led to theories that one of the bombs had been lost on the sea bottom. This is unlikely given the desperate efforts to locate all components, which the United States could not afford to have a foreign nation obtain. Most sources state that the secondary assembly of one bomb was retrieved from the sea bottom, although some wording suggests that not all parts were retrieved.

Radiological surveys apparently confirm that all major parts were recovered, but the possibility remains that classified items were sought and not found. During the recent diplomatic exchange over these historical events, Denmark asked about this matter, and got a polite say-nothing reply, as one would expect in an issue involving nuclear bomb construction and operation. The Danes, incredibly, asked to know the detailed components and construction of the B28 bomb, a request they could not possibly have expected would be answered. Off course it is possible that some true skullduggery has been concealed, but it would appear that here is a genuine case where it is appropriate to keep weapons details from winding up in the files of the world's aspiring troublemakers.

Nonetheless, this heroic operation in the dead of the polar night, without ship support, must have taxed the resources available to their limits. The work-intensive operation necessarily involved repeated very low-level exposure. Crews were decontaminated on site if the Geiger counters gave suspicious readings. Plutonium is not an immediate radiological danger like some other unstable metals, but becomes a powerful poison when ingested. Therefore it is unlikely that workers were contaminated simply by being physically present. Whether the radiation danger was handled as well as one would prefer today is subject to debate, but given the time and place and the knowledge of risk

prevalent then, the operation was a true triumph. (Think of what happened at Soviet nuclear accident sites.)















In recent years, some of the Danish personnel who had taken part in the recovery developed certain types of cancers and other unusual diseases. They got together and filed a case contending that the Crested Ice operation was responsible for their illnesses. The matter was, unfortunately, allowed to simmer in the Danish media just like Gulf War Syndrome did in the United States, subject to strident allegations of cover-ups by the authorities. Those participants who later developed illnesses -- regardless of whether they had anything to do with the clean-up or not -- were easily encouraged by groups of instigators, as we have seen in other cases where the word "nuclear" seems to have become more radioactive than the physical matters it pertains to.

Far be it from me to defend unexamined the actions of any government foreign or domestic, but I have reviewed similar cases from Bikini to Moruroa, and have everywhere found the same pattern in the debate: in the face of public emotion, truth, logic, and reason stand little chance. Crested Ice has not yet become a cause célèbre like Moruroa, but all the antecedents are there: suffering victims, inflamed public, official secrecy, the lure of restitution, and scientific studies that nobody believes unless they support somebody's cause.





The bomber had been flying the Arctic Circle route as part of the Strategic Air Command's continuous airborne alert operation; code-name "Chrome Dome." One crewmember was killed in the crash. The government of Denmark, which owns Greenland and prohibits nuclear weapons on or over its territory, issued a strong protest following large demonstrations in that country. A few days after the crash, U.S. Secretary of Defense Robert McNamara ordered the removal of nuclear weapons from airborne alert. The alerts themselves were later curtailed and then suspended altogether.


Christian Hansen

Old-timers who were there...

	Name.	workplace.	Year.	Bld. #.	@
	Michael Nielsen	Civil Engineering 574	08-65 to 01-68		@
	John Borup	Base Exchange, Warehouse	1966 - 1968	245	@
	Kjeld Holsting	Roads & Grounds / Tank Farm	1967 - 1970	326 & 132	@
	Brad Metcalf	TranNet, located in back of Danish Club	0168 to 0868	724	@
	Tom Bailey	data processing	1967 - 1968	452	@
	Villy Schlie	BMEWS dining hall	1965 -1968	99	@
	Jørgen C. Lakjer	Quality Assurance	1966 - 1997	444, 126	@
	Olaf Charles Mortensen	VM	1965 - 1971	323	
	Poul Erik Pedersen	B-Store, Commissary, Taxi.	1967 to 1973	243	@
	Ib René Clausen	Base Housing	1967 to 1968	722	@
	Kaj Igor Hansen	AB Library(US)	1967 to 1968		@
	Claes Wingård	Freight Handling (DCC)	1966-1969	587	
	Steve Murphy	Radar Tech, bldg 3	1966 to 1968	J-Site	

	Joe Sabash	RCA DR bldg 2 and CSMR	1967 to 1969	?	
	Stewart J. Yasko	J-Site PMEL	0164 to 0471	99, 100, 710	
	Ed Wright	Priority branch, Base Supply	1966 to 1967	?	
	Joseph M. Polyak	J-Site RCA Rearward Comm.	0966 to 0969	Bldg. 98	
	Roger A. Mock	Base CE	0467 to 0468	?? 3 Story NCO qtrs. 2000 something (I think)	
	Palle Erik (cigaren) Grønning	B.M.P.	1965 to 1970	446	
	Michael Boyce	J-Site in tech supply and in RCA supply on Thule AB	0766 to 0268	RCA/near runway and dining hall	
	Torben Kristensen	roads & grounds	1964 - 1995,1996, port operation 2001,2002,2003,2004	204,425,444,245,707,455,254	
	Terry Caton	Security Police	0867 to 0868		
	Rick Helean	CBPO	1967 to 1968	456	
	Ralph Abad	Polor Research And Development	1967 to 1968	U.S.Army The Mountain men	
	Russ Futchko	Data processing	0267 To 0268	452	
	Sven Jean Larsen	BX, NCOclub, DPO, DCC	1161 To 0670	135 and other barracks	
	Rudy Valenta	J Site	1267 to 1268	BMEWS	
	Jan Aage Jeppesen	Chief Clerk / Base Laundry	1967 - 1970		
	Robert Beck	RCS room at radar site	1967-1969 approximately	RCA Barracks 101?	
	Marvin Mathiowetz	BMEWS/MIP	1967-1969	RCA Barracks	
	Palle Elvej Ericksen	BMEWS dining hall	0166 - 0168	99	
	Jim Blackard	SRU #7	67-68		
	Helge C. Christensen	BMEWS Dining Hall	1066 - 0669	Bld. #99 & 13(?)	
	Floyd Ciamaricone	airways station (1983 com sq)	1267 to 1268		
	Jørgen Bøgebjerg	Preventive maintenance	1166 to 1268	P.mtn	
	Per Bergenstoff	Trans Alert	1966 til 1971	505	
	Joachim (Joe) Giger	Air Terminal	0767 to 0868	BOQ	
	Keslar W. Reeder, MSgt, USAF, Ret.	J-Site, BMEWS, Operations	0667 - 0668	#99	
	Frank Gingrich	12 MWS	7/1967-6/1968		
	Billy J Graham, Tsgt, USAF (Ret)	Camp Hunziker	Jan-Apr 1968	UKN	
	Charles Prichard	Security Police	1967-1968		
	Erik Hornstrup	Veh Maint. 580	1965 - 1968	345	
	Helge Fyhn	Sunec ,Stevedoring	1966 , 1967 , 1968	586 , 587	

	Poul Winckler	thule Base Exchange	1963- 1969		
	Fred St. John	J-Site RCS	1966 - 1969		
	Benny Nielsen (sløruglen)	Base Motor Pool	64-65 66 -69 72-90	212-331-333-444-	
	Poul Poulsen (sønderjyde)	hg.7- motor pool	0967 to 0770 - 0272 to 0375		
	John Ricards	Base Cashier	67 - 68	452	
	Gail Crane	Flight Attendant, Capitol International Airways	1966-1968	BOQ	
	Larry Coker	1983 Comm. Shop	0867 to 0868	123	
	John Hansen	BX 1967-69 Base ops.1970-74	1967 - 1974	133 og 336	
	Alf Bøgelund	BX	0564 - 0969	136-142-242	
	Kjeld Jensen	First SAC, then MAC terminal	1965 - 1969		
	Nils Lønstrup	kok, DH 1 og DH 5.	1967 til 1969	på basen/P mountain	
	Jens C. Knudsen	BX	67 to 71	Bld. #144 145	
	John Flint	U.S. Navy Rep.	1963 - 1968		
	Chips Maurer	Public Info Office	Sept 1967 Aug 1968	BOQ	
	Bill Rollins	SRU #7	1967 - 1968		
	Rob Switala	Accounting & Finance	1967 - 1968	452	
	Jørgen Blakmar	RCA, Fire Station	1965 to 1968	99, 343	
	Hugo Elmer	el-shop / service call	67 to 72	432	
	Gail Crane	Flight Attendant, Capitol International Airways	1966 to 1968	visitor to BOQ	
	John Blanding	J site, Bldg. 2 DR	67 to '69		
	Per Broberg Lind	Dundas	1963 to 1968	Dundas	
	Jon Ham	The Comm Center, 112	Sept. 1967 to: Sept. 1968	Can't remember, but was near the BX	
	Billy Farris	1964 to 1968	Heavy equipment operator, Camp century		
	Chuck Rose	Dispensary- Base Veterinarian	1067 - 1168, 0969 - 1070	USAF Dispensary	
	Jens Vendelbo	Kontor Assistent, bartender, radiovært	63-68		
	Joy Vanslette	U S O	0168 to 0268 (6 weeks)	??	
	Joseph Chundak	J-SITE	0867 to 0868	SECURITY POLICE	
	Dale Casey	1983 Comm.Sq. (s. mtn) &Hdqt.	0667 to 0668(no Leave)	Don't recall	
	Ron Milnarik	Dispensary-Dental Officer	0967-0868	USAF Dispensary	
	Thue Thuesen	RCA	1963 - 1969	99/97	
	Søren Hempel	BMEWS/RCA Motorpool	1963-1969	98	
	Mogens Hempel	Dept.B.#580..Hangar 8	2/7 66 - 9/4 70	331/131/445	

	Sam Verga	"Camp Hunziker"	0168 to 0568	Operation Crested Ice	
	Robert F. Thomas		67-69		
	Frank Phaneuf	BMEWS	0667 to 0568	J-Site	
	Ole Vestergaard	POL Hg. 4 and MAC Terminal	0766 - 0871	333	

Some of the sources:

Nuclear Weapons Databook -- U.S. Nuclear Forces and Capabilities, by Thomas B. Cochran, William M. Arkin, and Milton M. Hoenig, Natural Resources Defense Council, Inc., Ballinger Publishing, Cambridge, MA, 1984

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Sandia National Labs, Historical Highlights

The Bulletin of the Atomic Scientists, "Nuclear Notebook," October 1991

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