Karamken Dam Break Information
Compiled by
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February 28, 2012 Version of September 9, 2009 Compilation

A Gold Tailings Dam broke at Karamken in Magadan Region of the Russian Far East on August 28, 2009. This compilation provides links for photos, press coverage and other material

The Karamken Gold Tailings Site where the dam break occurred is located at:
60 degrees 14' N, 151 degrees 04' E

Images:
Photos by Olga Moskvina, Magadan Center for the Environment at
http://picasaweb.google.ru/MACEoffice (text in Russian): Photo albums include images from before the spill – 2004, 2005, July 2009 and after spill - August 28, 2009.
Additional information at http://www.mace.ru/ and
http://www.miningwatch.ru/content/blogcategory/63/86/.

Photos by Paul Robinson, Southwest Research and Information Center at
http://picasaweb.google.ru/sricpaul – before 2004.

Videos:
http://www.youtube.com/watch?v=17YgVhPLGWw linked from www.mace.ru at "Video 30.08.09"

http://www.youtube.com/watch?v=_r33Zlgf0iw&feature=player_embedded and
http://kprf.ru/rus_soc/70380.html

Press Coverage:
http://en.rian.ru/russia/20090907/156044358.html
Construction workers restore burst dam in Russia's Far East
06:4507/09/2009
VLADIVOSTOK, September 7 (RIA Novosti) - Construction workers in Russia's Far East have restored a dam that burst open two weeks ago killing one man and destroying nearby houses, a spokesman for the local emergencies ministry said on Monday.
The dam across the Tumannaya River near the village of Karamken in the Magadan Region burst on August 29 after three days of heavy rain. Nearby homes were flooded, with one man killed and a local woman still missing.
Epidemiologists have been monitoring the water in the Khasyn River downstream, which is rich in fish stocks, and deep wells in two nearby villages. No increase beyond the maximum permissible concentration of harmful substances has so far been reported.
The dam contained a reservoir for dumping tailings from gold mining, including heavy metals and cyanides. The Karamken gold mine has been idle for 15 years.

http://en.rian.ru/russia/20090902/155995046.html
Flooded village in Russia's Far East to receive $220,000

© Olga Moskvina

10:3602/09/2009
VLADIVOSTOK, September 2 (RIA Novosti) - Authorities have allocated some 7 million rubles ($220,000) to provide accommodation and compensation for people affected by a burst dam in Russia's Far East, a local official said on Wednesday.
The dam across the Tumannaya River near the village of Karamken in the Magadan Region burst on Saturday after three days of heavy rain. Nearby homes were flooded, with one man killed and a local woman still missing.
"A decision was made ... to allocate funds for the purchase of housing in the [nearby] village of Palatka and the repair of empty apartments in the village of Karamken to accommodate homeless locals," the official said.
A total of 6 million rubles ($188,800) will come from the regional budget for the accommodation, and another 1 million rubles ($31,500) will be paid as compensation. However, the sum may be reviewed when a special commission assesses the exact damage.
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http://en.rian.ru/russia/20090831/155974576.html
Probe launched into Saturday's dam accident in Russia's Far East
16:0331/08/2009
VLADIVOSTOK, August 31 (RIA Novosti) - Investigators started a preliminary probe on Monday into the recent bursting of a dam in Russia's Far East, in which at least one person was killed, a regional investigation spokesman said.
The tragedy occurred in the village of Karamken in the Magadan Region at 14:30 local time (02:30 GMT) on Saturday after heavy rain. Nearby homes were flooded when the dam across the River Tummanaya burst, and one local woman is still missing.
"A pre-investigation check has been launched and will last at least 10 days," the spokesman said, adding that officials from the industrial safety regulator Rostekhnadzor, along with hydroelectric experts, would be involved.
Residents of Karamken, home to just 57 people, have said the local authorities should be held responsible for negligence.
Magadan Region Governor Nikolai Dudov has visited the site of the accident. A diesel power generator was brought to the village on his instructions, enabling electricity and water supplies to be resumed.
Currently 81 people and 37 vehicles are working to repair the dam.
A local scientist has warned that if the dam is not repaired carefully, pollutants could spill into the Khasyn and Arman rivers, threatening fish stocks.

The dam was built on a reservoir for dumping tailings from gold mining, including heavy metals and cyanides. The Karamken gold mining plant has been idle for 15 years.
"Everything depends on how the dam is repaired. If it is just covered hastily, the environment will be harmed," Vyacheslav Kharitnov, chief aquatic biologist at the Institute for Biological Studies at the Far Eastern department of the Russian Academy of Sciences
(Photo in original)

http://en.rian.ru/russia/20090829/155958324.html
Burst dam in Russia's Far East kills one, two missing
12:0229/08/2009
VLADIVOSTOK, August 29 (RIA Novosti) - One person was killed and two others are missing when heavy rain caused a dam to burst in Russia's Far East, a local emergencies ministry spokesperson said on Saturday.
The tragedy occurred in a village in the Magadan Region around 14:30 p.m. local time (02:30 GMT) some 27 homes were affected when the dam across the River Tummanaya burst.
"Out of 27 homes in the village, 11 were carried away by the rush of water. One person died, two are missing," Ekaterina Potvorova said, adding that "work has started to strengthen the dam. The situation is under control."
She said that the storms are currently subsiding and water levels in the river are falling.
The tragedy is the second this month involving dams in Russia.
At least 71 people were killed following a blast at a hydroelectric station in South Siberia on August 17, which occurred during repair work at the Sayano-Shushenskaya station, Russia's largest.

(Photo in original)

One dies, two missing as mudflow hits settlement in Magadan Region
29.08.2009, 09.21

http://www.itar-tass.com/eng/level2.html?NewsID=14280527&PageNum=0

KHABAROVSK, August 29 (Itar-Tass) -- One died and two people are missing in the settlement of Karamken in the Magadan region, where a mudflow tore off eleven prefabricated houses on Saturday, the Emergencies Ministry's Far Eastern regional centre told Itar-Tass.
Twenty four people, residents of the houses, were rescued and evacuated from the dangerous zone.
People moved from the village during several years after the shutdown of the local mining works, but 57 people still reside there. Rescuers are continuing to work at the site. The region's governor has left for the hit area.

http://www.pacificenvironment.org/article.php?id=3111
Dam Bursts at Gold Mine Tailings Pond in Magadan, Russia

Photo courtesy of Paul Robinson, SRIC

On August 29, heavy summer rains caused a dam on the Tumannaya River to burst, flooding Karamken, a village of 60 located north of Magadan in the Russian Far East. One person has been confirmed dead and two more are missing.

The ruptured dam held the Karamken Minerals Processing Plant tailings pond, a reservoir that the gold mining facility used to store tailings, a slurry of spent ore and cyanide-contaminated water.

The plant has stood idle in the village since going bankrupt in 1997, and its cyanide-laden sludge remains in the reservoir without any measures to keep the contaminated water from leaching into the groundwater system – an alarming fact for a village that draws its drinking water from a well. Moreover, the nearby Kolyma Gold Refinery was granted license in 2002 to dump its industrial waste into the tailings pond and since then has been adding such toxins as cadmium, zinc, copper sulfate, and chlorine into the reservoir. Though the municipal government is responsible for maintenance of the tailings pond, it does not have the budget to manage the many tons of hazardous waste at the site.

When Pacific Environment traveled with the Southwest Research and Information Center and long-time partner Magadan Center for the Environment (MACE) to Karamken to study the tailings pond and dam in 2004 and 2005, they found that the reservoir, built hastily and cheaply without a layer of insulation and a number of other safety features, the structure does not successfully isolate the tailings from the surface and groundwater systems.

Concerned for public health and safety, MACE sent several appeals to the local administration and the regional Environmental Supervisory Agency between 2003 and 2005, stating that the tailings pond was extremely unsafe. The environmental nonprofit urged for emergency repairs at the dam, as well as water quality monitoring and recultivation measures at the tailings pond.

In response, experts from the local branch of the Russian Academy of Sciences Research Institute came to inspect the tailings pond and the dam in 2005 and deemed them in “satisfactory condition”, saying the dam was stable and unlikely to rupture. The Environmental Supervisory Agency’s analysis of the water quality determined that the contaminant concentration levels were insignificant for fisheries and safe for drinking. The administration called for repairs at the tailings pond, but only the water diversion canal and supporting dam wall received marginal repairs, and a few monitoring wells were installed. The Environmental Supervisory Agency repeated its analysis of the drinking water last month at the villagers’ request, and once more determined the contaminant concentration levels to be safe for drinking.

Still unconvinced of the dam’s safety, MACE wrote to the local prosecutor’s office one week prior top the accident, requesting that the authorities review the legality of dumping toxic industrial waste into a hazardous tailings pond. There was no time for a response, as the Karamken dam ruptured just days later, spilling its contaminated waters into the village and washing away 11 homes and knocking out electricity.

As the water level recedes, the Russian Technical Oversight Agency and the regional Ministry of Emergency Situations are on the ground leading investigations and cleanup efforts. While these agencies and local media have assured Karamken residents that testing reveals no contamination of the drinking

water, locals report an acrid smell and metallic taste to the yellow water that has destroyed their homes and killed the dogs in the village. Should the heavy metals and chemicals in the tailings pond be flowing into the Khasyn River, these could cause severe damage to the local salmon fisheries and threaten public health.

MACE is monitoring the development of the situation in Karamken and ensuring that accurate and complete information be made available to the public. MACE and Karamken residents are urging regional and federal bodies to investigate the extent of possible contamination from the damaged reservoir and mandate that recultivation measures be implemented at the site.

Additional images at http://www.pacificenvironment.org/article.php?id=3115.

http://www.sric.org/mining/docs/FRAEC-cit-guide.pdf
KARAMKEN: AN ABANDONED GOLD FACILITY SHOWS THE NEED FOR RECLAMATION IN MAGADAN OBLAST, RUSSIA
Paul Robinson
Southwest Research and Information Center
From *Voice from the Earth* Vol. 5, No. 3, Fall 2004
http://www.sric.org/voices/2004/v5n3/Karamken.html

View Downstream from Crest of Karamken Tailings Dam

Southwest Research and Information Center works with environmental leaders and community organizations in Siberia and the Russian Far East by providing technical assistance to support local efforts to address the environmental impacts of Soviet-era mines. Another focus is to insure that new mines use pollution prevention technologies and provide for guaranteed reclamation after closure. Local examples of mine impacts and the introduction of innovative technologies are critical to effective communications in Russia - as is true in any mining region around the world. One of the challenges facing local organizations has been the lack of specific examples of environmental problems at specific mines in Russia. This was the goal of Research Director Paul Robinson's visit during a July 2004 mining exchange to the Magadan and Kamchatka Regions - identify compelling examples of mine and mine waste impact problems in those regions. This goal was attained during a tour of the Karamken gold complex in Magadan region led by the Magadan Center on the Environment (MACE) and the North East Interdisciplinary Scientific Research Institute (NEISRI) in Magadan City.

The Magadan region is in the Russian Far East northwest of the Kamchatka Peninsula and has been a major center for extraction of gold, silver and other metals and minerals for more than 70 years. During the Stalin period, Magadan was synonymous with the Gulag chain of forced labor camps, where the camps were very often gold mines. Prior to the end of the Soviet Union, the Magadan Region was reported to have produced more than 3000 tons of gold from both placer and hard rock gold deposits. With the fall of the Soviet Union, many operating gold mines and mills were quickly shut down and abandoned. One of the largest of the abandoned gold complexes was at Karamken, 100 kilometers (60 miles) north of Magadan City, the regional capital. The Karamken site is on a tributary to the Khasyn River, near a producing salmon fishery

Karamken was a modern facility by Soviet standards. Opened in 1978 to process gold ores from nearby hard rock deposits, during the 1980s the facility also processed gold and

silver ores from throughout the Magadan Region, including the Kolyma River Basin of northern Magadan, the source of most of Magadan's mineral wealth. Shut down with the end of the Soviet Union in the early 1990s, the Karamken mill and tailings complex had been considered for the processing of ores from post-Soviet mines such as the Dukat silver-gold mine and the Aginskoe gold mine. However, neither of these plans to operate the Karamken complex came to fruition and the site, with its complex of mines, mill and tailings pond remains abandoned without any apparent reclamation and closure activities. The site was the subject of field trip in July led by Ogla Yaroslavna Moskvina, Project Director at MACE, and Vladimir Egorivich Glotov, Deputy Director of NEISRI. The Karamken tailings site had been subject to a ground water pollution investigation during the mid-1990s that Dr. Glotov's Institute was involved in. His vast knowledge of the site made the visit particularly valuable.

The tailings (the waste from the cyanide-leach circuit for precious metal recovery) from the Karamken mill were deposited behind a 20-meter high, 300-meter long retention dam built across a perennial stream, Tyumanni Creek, that flowed into and through the town of Karamken downstream of the dam. The creek was blocked and diverted by a 200-meter long head dam. The integrity of the tailings retention dam, and the long-term containment of the tailings, depends on the effective diversion of all upstream flows, and the prevention of either overfilling, oversaturation, or erosion of the retention dam.

View of Inlet to Diversion Channel without Pillars to Prevent Intrusion of Ice into Diversion System

The head dam is impounded with a 0.5 x 0.5 square kilometer lake and was constructed using "thermistors" (devices to maintain frozen conditions) to insure a that the dam had a non-porous frozen core. The surface flow outlet for the lake is a diversion channel paralleling the east side of the tailings disposal area. The kilometer-long diversion channel was built with some portions lined with sheet metal and some portions lined with

concrete panels. During operations, the diversion channel inlet was protected by a row metal posts driven into the lake bottom to form an "ice barrier" to prevent damage to the diversion channel from the 1-2 meter thick ice released during the Spring break-up in the upstream lake.

View of Vandalized Thermistors Designed to Keep Upstream "Head" Dam at Karamken Frozen

The head dam, ice barrier, and diversion channels have all suffered so significantly from neglect and vandalism that they are unable to perform their designed functions. Of the original 18 pilings driven in to the lake bottom to block ice only the stumps of two pilings are still visible. For all practical purposes the ice barrier no longer exists. All the thermistors have been vandalized and are no longer functioning. The head dam no longer has a frozen core and hasn't for years. The metal sheets in the diversion channel are bent and warped, allowing a significant portion of the water flowing from upstream to enter the tailings disposal area rather than flow around it.

As a result of the deterioration of the head dam and diversion system the tailings are no longer isolated from upstream water flows. Rather than a tailings disposal system where groundwater flow is blocked by a frozen dam core, the destruction of the thermistors leaves the head dam porous along its 200 meter length, with groundwater continuously

flowing into and though the tailings. And rather than conveying all surface water around the tailings, the damaged diversion channel allows surface water to continuously enter and flow through the tailings. The destroyed ice barrier no longer provides any protection for the diversion channel or head dam, allowing ice to build up at the inlet to the diversion. This leads to overflows into the tailings disposal area, as ice "pounds away" at the sides and base of the diversion channel.

Downstream the failures continue. According to Dr. Glotov, the tailings retention dam was designed to be constructed with a "key trench" cut into solid bedrock beneath the whole length of the dam to prevent groundwater flowing under the dam. It was also

supposed to be solidly connected to the rock at either end of the dam with concrete to prevent groundwater flowing through the sides of dam. The retention dam relied on a pair of metal siphon tubes to convey excess surface water due to peak flood events over the top the of the retention dam. No back up spillway to convey excess water over the dam was designed or built. The overflow control siphons have been as badly vandalized as the thermistors and ice barriers at the upstream end of the tailings area. Only the skeleton of the siphon remains as the pumps and piping necessary to operate the siphons were removed and the metal left on site was heavily vandalized. As a result, no system is in place to convey peak flows over or around the tailings area.

View Towards Downstream Watershed Showing Vandalized Siphon Pipes on Crest Tailings Dam

The detection of cyanide in groundwater supplies in the town of Karamken downgradient of the tailings area led to investigations of the subsurface structure of the retention dam. Those investigation showed that the dam was not built as designed and was not "keyed into" underlying bedrock. Subsurface investigations through boreholes demonstrated that the retention dam actually overlay a 20-30 meter thickness of porous alluvial valley fill and weathered bedrock. The investigation also showed a porous fault zone along the side of the dam that had not been detected, or not been revealed, in pre-construction studies. Therefore, rather than the retention dam being a barrier to groundwater flow, the dam allowed groundwater to flow under and around it. Indeed water was pushed downward and beyond the downstream end of the dam by the huge weight of water and tailings held back by the dam. Pollutants released under and through the retention dam exceeded cyanide standards 3 kilometers (more than 1.5 miles) downstream of the tailings area. Pollution control efforts downgradient of the dam were added after the pollution was discovered. These included a row of pumped wells immediately beyond the downstream "toe" of the dam and injection of clean water beyond the pumped wells to dilute

pollutants.

The range of problems at the Karamken tailings site reads like a checklist of defects to prevent when closing and reclamation a tailings sites. The site suffers from:
• lack of an effective closure plan;
• lack of resources to implement an effective closure plan;
• dependence on control technologies that require extensive maintenance to function;
• inability to prevent wholesale vandalism;
• failure to isolate the site from surface water and groundwater flows; and
• failure to construct the facility as designed.

This set of characteristics leave the Karamken sites and the community and watershed downstream from it vulnerable to continuing pollutant releases and potential dam failure due to overtopping or oversaturation. While the problem is well recognized by specialists at NEISRI, activists at MACE, and regulatory agencies such as the Ministry of Natural Resources, no governmental or private funding source is available to address the short-term or long-term risks the sites present.

The complex set of problems at Karamken result from a combination of inadequate design, inadequate review during construction, lack of effective closure methods, and lack of resources to insure or maintain closure. The site is a visually striking example of how bad conditions can get without effectively designed or financially guaranteed reclamation and closure plans.

Though gold and silver mining is expanding in Magadan and other mining regions of Russia, the disclosure, independent assessment, and financial guarantee of reclamation plans commonplace in the U.S. and Canada have yet to be adopted. However, even U.S. and Canadian firms and facilities funded by international financial institutions fail to publicly disseminate reclamation plans, regulators have yet to conduct independent technical reviews of reclamation plans, and mine operators have yet to establish bonds, insurance or independent bank accounts to guarantee that reclamation plans are conducted. The pattern of activity and images from the Karamken site will serve as powerful example of the environmental consequences of abandonment of mine waste sites without effectively guaranteed closure.

Just as the disclosure, review and financial guarantee of reclamation designs has yet to emerge in Russia, no abandoned mine land reclamation program exists there either. The backlog of leaky, rusty and risky mine waste sites in the former Soviet Union, including Russia and the newly independent states, is huge and a growing threat to ecological and community resources in areas that never saw much benefit from the original mining activity in the first place.

The prospect for a full and effective reclamation of the Karamken site under the current circumstances in Magadan Regions is somewhere between slim and none - much closer to none. And the potential for emergence of a future operator of the site, even in this period of high gold and silver prices, who might address reclamation as a part of a new phase of precious metal production, is reduced by the poor conditions at the site. These constraints prevent an effective response to the environmental risks at Karamken in the short run.

Whether a successful effort to reclaim the site can be mounted or not, Karamken stands as a visible warning to those who see the site or study its condition, of what to avoid in future mine and mill development in the Russian Far East and across that enormous country. While the site provides examples of problems to avoid, and therefore lessons to

be learned, Karamken is still a very important site for those concerned about the environmental and watershed impacts of mining in Russia, one the world's most aggressive mining nations.

(Historical Press Coverage)
http://www.nytimes.com/1987/04/07/world/karamken-journal-siberian-gold-galore-but-would-lenin-approve.html
KARAMKEN JOURNAL; SIBERIAN GOLD GALORE: BUT WOULD LENIN APPROVE?
By BILL KELLER, Special to the New York Times
Published: Tuesday, April 7, 1987
"When we are victorious on a world scale, I think we shall use gold for the purpose of building public lavatories in the streets of some of the largest cities in the world," Lenin wrote in 1921.
"I don't know what this means," said Nikolai M. Selyutin, manager of the Karamken gold mine and concentrator here. "But we believe in it."
Perhaps, but Lenin's vision of a time when the quality of life would no longer be tied to the value of gold seems, in this gold-dominated Magadan Province of northeast Siberia, far off, and getting further.
Pressed by the need for foreign currency to support a planned modernization of industry and to make up for slumping oil revenue, the gold industry is expanding.
How much of an expansion, like almost every detail of the gold industry, is a carefully guarded secret, as a group of Western reporters found during a closely supervised visit to this gold-lode mining complex.
Playing a Cat-and-Mouse Game "Where do you send your refined gold," a reporter asked, before a descent into a mine shaft.
"To the central part of the country," replied Mr. Selyutin, a good-natured engineer who seemed faintly amused at the cat-and-mouse game. "What city?" "To the central part of the country," he repeated.
"How many workers do you have?" "Enough to work profitably." When asked for production figures, Mr. Selyutin simply laughed, flashing a row of gold caps.
The Soviet Union, the second largest gold producer after South Africa, publishes no statistics on gold, or on most other metals for that matter. Western researchers have been computing various estimates based on scattered information about producing centers and about sales on the international gold market. Shock Absorber for the Economy The gold reserves are a vital shock absorber for the Soviet economy, especially now when lower oil prices have cut into export earnings.
According to recent joint report of the Central Intelligence Agency and the Defense Intelligence Agency to the Joint Economic Committee of Congress, the Soviet Union sold $3.8 billion worth of gold last year, up from $1.8 billion the previous year and from $1 billion the year before.
Without gold, Magadan Province might well still be the exclusive preserve of Chukchi reindeer herders and other indigenous peoples.
It was the goldfields of the Kolyma River, discovered in the late 1920's, that drew geologists to this area. It was gold that made the region a logical, if cruel, site for Stalin's notorious labor camps from the 1930's to the mid-1950's. From the camps, ordinary convicts and political prisoners were marched to work in the gold pits at temperatures of more than 50 degrees below zero.
Gold is believed to be one reason Magadan Province has been closed to most foreigners. The recent visit here was the first ever by a group of non-Communist journalists.
Aleksandr D. Bogdanov, provincial party chief, estimated that mining accounted for two-thirds of the province's 2 billion rubles ($3 billion) in annual industrial output. The province also yields silver, tin and tungsten, but mostly gold.
"Almost the entire economy of the province is based on gold," said Tatyana M. Malinovskaya, a party official in the northern gold town of Bilibino.
Her, at the nine-year-old Karamken complex, about 50 miles north of the city of Magadan, visitors pass through a guarded turnstile and into a dressing room where they don a miner's cold weather uniform of blue long johns, heavy cotton work clothes, parkas and hard hats. Then down several flights of stairs to collect battery-powered lamps, and out the door to a metal shed that serves as the depot for the mine train. Placer and Lode Deposits In Siberia, gold is either bulldozed or dredged from surface gravel deposits known as placers or, as in the case of Karamken, dug from deep lode mines. The placers were the first to be mined starting in the 1930's, and as they became played out, the industry has been increasingly blasting into bedrock.
A 12-minute ride on an East German mine trolley, clattering down a narrow, concrete-lined shaft takes the miners two miles into the mountain. The air, pumped in through conduits, is cool and fresh, but not uncomfortably cold.

The mountain is criss-crossed by horizontal tunnels on six levels. On the upper levels, miners use compressed air guns to dig holes for dynamite, then blast and dig the ore, and spill it down chutes into waiting ore cars in the lowest tunnel.

The ore itself is unremarkable to the eye, the gold so thinly dispersed that it hardly glitters. There are no nuggets to be pocketed. Work Goes On Around the Clock Miners work around the clock, in four six-hour shifts - first a blasting crew, then several hours of preparing the shaft, and finally two digging shifts.

At the concentrator near the mouth of the mine, lumps of ore are fed into a crushing mill and ground to powder. The powder is mixed with water, and the gold and silver are separated chemically.

Miners earn 700 rubles (about $1,000) a month, a high salary by Soviet standards because of a premium paid in this remote region.

Lenin's dictum notwithstanding, the lives of workers here are becoming more dependent on gold, not less. Next year the mine here is scheduled to join other Soviet industries in "self-financing," which means that the mine administration will keep a share of the profits to spend as local managers see fit on housing, new equipment and amenities for workers, things that now come from the budget of the Ministry of Nonferrous Metals in Moscow.

But then, Lenin himself conceded that, pending the world revolution that would render gold into toilets, Russia should get as much of the stuff as it could. In a metaphor that seems especially suited to the tundra of northeast Siberia, he said, "When you live among wolves, you must howl like a wolf."