

## Environmental Contamination at Largest US Air Force Base in Asia: Kadena, Okinawa

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*Located in the center of Okinawa Island, Kadena Air Base is the largest United States Air Force installation in Asia. Equipped with two 3.7 kilometer runways and thousands of hangars, homes and workshops, the base and its adjoining arsenal at Chibana sprawl across 46 square kilometers of Okinawa's main island. Approximately 20,000 American service members, contractors and their families live or work here alongside 3,000 Japanese employees. More than 16,000 Okinawans own the land upon which the installation sits.<sup>1</sup>*

Kadena Air Base hosts the biggest combat wing in the USAF – the 18th Wing – and, during the past seven decades, the installation has served as an important launch pad for wars in Korea, Vietnam and Iraq. Given the long history of Kadena Air Base and its city-sized scale, it is easy to understand why the USAF calls it “The Keystone of the Pacific.”

But until now, no one has realized the damage the base has inflicted on the environment and those who live in its vicinity. Documents obtained under the U.S. Freedom of Information Act reveal how years of accidents and neglect have polluted local land and water with hazardous chemicals including arsenic, lead, polychlorinated biphenyls (PCBs), asbestos and dioxin. Military authorities have often hidden this contamination, putting at risk the health of U.S. service members, Okinawan base employees, and the 184,000 Okinawan civilians living in neighboring communities.

### **Japan-U.S. Status of Forces Agreement (SOFA) and the environment**

Japan hosts 130 U.S. bases – 32 of which are located on Okinawa – but the Americans who serve upon them and local residents know nothing of the dangers these installations pose to human health or the environment.<sup>2</sup>



Farmer's fields near Kadena Air Base

At the root of the problem lies the Japan-U.S. Status of Forces Agreement (SOFA) which makes no allowances for Japanese officials to conduct pollution checks within U.S. bases. Nor does it hold the military responsible for cleaning up land returned to civilian usage.

In 2015, Washington and Tokyo tagged a supplementary agreement onto SOFA giving local authorities the right to request a base inspection following a spill. However so far, the

Pentagon has failed to green light any such requests.<sup>3</sup>

Since SOFA absolves the U.S. of all financial responsibility to clean up contaminated land, the costs are borne by Japanese taxpayers. The financial burden of military contamination is particularly heavy on Okinawa, Japan's poorest prefecture, where U.S. bases take up roughly 20% of Okinawa's main island but contribute only 5% to the prefecture's economy.<sup>4</sup>

In Chatan Town in 2002, for instance, the cost to clean up 187 barrels of unknown chemicals dumped by the U.S. military amounted to approximately 20 million yen.<sup>5</sup> Elsewhere redevelopment of land returned from Camp Kuwae, has been delayed for more than 12 years due to contamination from arsenic, lead and oil.<sup>6</sup>

With both SOFA and the new agreement failing to protect Japan's environment, it comes down to Japan Environmental Governing Standards. The guidelines set out when U.S. forces need to report spills to the Japanese government, for example, after they surpass a certain volume or contain a substance listed as hazardous. However, they do not assign punishments to bases breaching environmental policies or hold the military responsible for cleaning up contamination inside or outside its bases.<sup>7</sup>

This combination of flawed regulations and lack of transparency creates obstacles for researchers trying to ascertain pollution within U.S. bases in Japan. Scientists can only check land already returned to civilian usage – by which time it is too late to prevent contamination – or conduct tests on wildlife captured near active bases to determine whether their tissues contain traces of toxins. Given these constraints, perhaps the most effective way to lift the lid on what goes on behind the fences of U.S. bases in Japan is the Freedom of Information Act.

## **8725 pages released under FOIA**

In January, the USAF released 8725 pages of accident reports, environmental investigations and emails related to contamination at Kadena Air Base. Dated from the mid-1990s to August 2015, the documents are believed to be the first time such recent information detailing pollution on an active U.S. base in Japan has been made public.

The documents catalogue approximately 415 environmental incidents between 1998 and 2015; 245 of these occurred since 2010. Incidents range from small leaks, which stayed within the base, to large spills discharging tens of thousands of liters of fuel and raw sewage into local rivers.



Leaks of jet fuel – such as this small one in 2008 – totaled more than 40,000 liters since 1998

During the 1998-2015 period, leaks totaled almost 40,000 liters of jet fuel, 13,000 liters of diesel and 480,000 liters of sewage. Of the 206 incidents noted between 2010 and 2014, 51 were blamed on accidents or human error; only 23 were reported to the Japanese authorities.

The year 2014 saw the highest number of accidents: 59 – only two of which were reported to Tokyo.

Because large parts of the documents have been redacted and there are no reports for the 2004-2007 period, the actual statistics are likely much higher.

### **The impact on local water**



Due to its location in densely populated southern Okinawa, Kadena Air Base plays an integral role in the supply of the island's drinking water. Within the installation, there are 23 wells, some of which contribute to on- and off-base drinking water. More than 300,000 meters of drains carry the installation's storm water into local rivers – including the Hija River, which supplies drinking water for six municipalities and Okinawa's capital, Naha.

U.S. documents suggest that mistakes and negligence on the base have repeatedly endangered this water supply.

For example, in August 2011, 760 liters of diesel spilled into the Hija River when an operator abandoned a generator tank prior to the arrival of a typhoon. In December 2011, 1,400 liters of diesel leaked from USAF housing on Camp McTureous due to officials ignoring a warning light; the fuel contaminated the Tengan River.

Other reports suggest that miscommunication exacerbated spill incidents. In June 2012, it took an engineer 1 hour 20 minutes to respond to a 190-liter fuel spill because he was at the food court and could not hear his telephone ringing. More recently, in February 2015, environmental teams failed to respond to two incidents – the first involving 170 liters of fuel and the second 23 liters of hydraulic fluid – despite being alerted by emergency crews.

As well as fuel leaks, the base mistakenly released at least 23,000 liters of fire suppressant foam between 2001 and 2015. In August 2012, a Japanese firefighter set off a fire system in an accident that leaked 1,140 liters. Then in May 2015, a drunk U.S. Marine, released 1,510 liters in an act of vandalism.<sup>8</sup>

Such foams can contain carcinogens, chemicals known to cause reproductive and neurological disorders, and perfluorooctane sulfonate (PFOS). PFOS, categorized by the EPA as an emerging contaminant, has recently become the focus of concerns both on Okinawa and in the U.S.



In August 2011, a failure to empty a generator prior to the arrival of a typhoon caused the leak of 760 liters of diesel into a local river

In January, Okinawa Prefecture announced that waterways around Kadena Air Base were currently contaminated with PFOS; in 2008, levels in an on-base well measured as high as 1870 ng/L.<sup>9</sup> The EPA's provisional health advisory limit for drinking water is 200 ng/L. In March, the USAF promised to conduct tests for PFOS contamination on 664 bases in the U.S.<sup>10</sup>

Ikeda Komichi, adviser at the Environmental Research Institute Inc., Tokyo, emphasized the potential dangers of PFOS. “Current research suggests it may cause cancer, reproductive disorders and damage the next generation. Pregnant women and young children ought to be especially careful to avoid consuming water contaminated with PFOS.”

Since 2008, Kadena Air Base has also spilled at least 1,670 liters of hydraulic fluid – a known source of PFOS; meanwhile drains from the base’s fire-training area, where foams are routinely sprayed, feed into local waterways.

Another threat to Okinawa’s drinking water comes from leaks of raw sewage, which the base apparently only started recording in 2010. In November 2010, a 57,000-litre spill contaminated the Shirahi River and the sea with sewage measuring 36,000 fecal coliform colonies/100ml – 90 times the EPA’s maximum limit for swimming waters.

More recently, in June 2013, an overflowing manhole leaked 208,000 liters of sewage into the Hija River. The base took 27 hours to notify local authorities, but its subsequent press release stated, “The health and safety of our service members and our friends in local community is our top priority.” Follow-up emails exchanged among USAF officials include the comment, “We received little media coverage. So that’s good news.”

Meanwhile, in November 2009, service members dumped 17 liters of liquid fog solution into storm drains despite manufacturers’ instructions not to release the substance into sewer systems. Likewise, in July 2014, service members dumped hundreds of liters of medical waste – described as “expired shelf-life injectable fluids” – into on-base drains. “It’s very unlikely that anything will be seen or reported but if the milky solution reached the Hija river we will have a very upset public,” stated the report. Neither the 2009 nor the 2014 incident was reported to the Japanese government.



Photo caption: An unknown substance claimed to be sea dye leaks from a tank on Kadena Air Base in an undated photo. No records exist for the spill suggesting it was unreported even within the military.

Furthermore, the documents highlight the dangers of operating a busy airport in the midst of civilian communities. Numerous in-flight emergencies (IFE) cause pilots to abort their missions – two occurring in a one-week period in January 2015. Also, in August 2011, an IFE caused an F-15 to dump 150 liters of fuel from low altitude. The summary concluded, “There was no impact to the local community.”

### *Lead and asbestos*

Back on the ground, the FOIA-released documents point to the exposure of U.S. and Japanese nationals to dangerous levels of lead and asbestos.

For many decades, a furnace within the installation burnt ammunition and “other exotic pyrotechnics” without any emission controls. In 1993, investigators discovered this incineration had contaminated nearby land with lead at 13,813 mg/kg and more distant jungle with 6000 mg/kg. There were “small farms and vegetable plots” in the area and the site was near a waterway.

Another burn pit, cited in an April 1994 report, was blamed for lead concentrations in soil

exceeding 500 mg/kg with fields again apparently in the close vicinity.

The Japanese government's clean-up standard for lead contamination in soil is 150 mg/kg. Japan has no standard for agricultural land but in Germany the maximum level permitted is 100 mg/kg.



Environmental expert, Ikeda Komichi, at her Tokyo office.

"People working in the area need to worry about intellectual disabilities and damage to their nervous systems. Also if they inhaled this lead and other substances over a long period it may have caused reproductive damage and harmed organs such as the blood and kidneys. Because the levels are so high, there is the very strong chance that the land remains contaminated today," said Ikeda.

She also criticized the reports for their lack of data on other heavy metals likely discharged during the incineration of ammunition, including depleted uranium, which the USAF used widely in the 1990s.

Moreover, surveys from 2000 to 2001 revealed serious contamination from asbestos in many buildings such as dormitories, mess halls and boiler rooms. Inspectors found large chunks of deteriorating asbestos materials scattered onto nearby lawns.

One of the locations was an abandoned hospital which, prior to 2000, had been used for "readiness training". Investigators noted how military personnel had used axes and chainsaws to breach asbestos-packed doors - resulting in the spread of "friable" (easy to crumble) material across a 460 m<sup>2</sup> area.

WHO estimates that asbestos is responsible for one third of occupational cancer fatalities worldwide.<sup>12</sup> In recent years, Japanese base employees have struggled to win compensation from Tokyo for illnesses attributed to their work in asbestos-contaminated environments. Many were ordered to work without proper safety equipment. In 2014, the Japanese government finally agreed to pay compensation to 28 victims, but survivor support groups and base worker unions estimate the number of sick is likely much higher.<sup>13</sup>



Former base worker, Tamura Susumu, witnessed firsthand the dangers of asbestos. Employed on U.S. bases for 43 years until the 1990s, his testimony helped to win compensation for the family of a colleague killed by asbestos-related lung disease.

In a recent interview, Tamura recalled the dilemma faced by many Okinawans employed by the U.S. military: "Even if we thought what we were ordered to do was wrong, we didn't refuse. We were worried we'd be fired."

During his time on the bases, Tamura regularly witnessed lax environmental standards - including the illicit dumping of waste and shoddy clean-up work.

"Nowadays, safety conditions may have improved, but in the past, the only way to describe

them *wasyaritai hodai* – the U.S. military did whatever they wanted.”

Photo caption: Former base worker, Susumu Tamura, holds his commendation for 40 years of work on U.S. installations; many Okinawan base workers were not so lucky.

### **Past negligence returns to haunt current service members**

Before Okinawa’s reversion to Japanese rule in 1972, Kadena Air Base and the adjacent ammunition depot at Chibana stored one of the largest arsenals of weapons of mass destruction on the planet: 800 nuclear warheads, a stockpile of herbicides suspected to be Agent Orange and thousands of tons of mustard, VX, and sarin gas. In the late 1960s and early ’70s, two leaks of chemical weapons hospitalized 27 Americans while so much jet fuel seeped into local water wells that they actually caught fire.<sup>14</sup>

During the 1970s, the disposal of surplus chemicals from the Vietnam War also contaminated Camp Kinser (then known as Machinato Service Area) with PCBs, heavy metals, pesticides and Agent Orange dioxin.<sup>15</sup>



The current U.S. custodians of Okinawa’s bases know very little of their hazardous history – particularly when it comes to the disposal of toxic substances.

At Kadena Air Base, documents dating from the 1990s to 2015 repeatedly record service members stumbling upon pollution caused, but not reported, by their predecessors. Underground discoveries include POL (petroleum/oil/lubricant) contamination, white phosphorous and abandoned storage tanks, one of which leaked approximately 450 liters of diesel, endangering nearby farmland in March 2012. In July 2014, the discovery of a buried barrel of chemicals within the installation sparked emails urging responders to keep a “low profile please. Don’t want this release (sic) to press.”

Photo caption: An abandoned storage tank endangered farmers’ fields when it leaked 450 liters of fuel in March 2012

### **PCBs**

This struggle to control information about past contamination is highlighted by the base’s ongoing troubles with PCBs<sup>16</sup> Throughout much of the 20th century, PCBs were a common component of electrical transformers but they were banned by the US in 1979 when linked to cancers and problems with the nervous, reproductive and immune systems.<sup>17</sup>

During the 1970s, service members at Kadena Air Base stored PCB-contaminated oil in a 21-meter wide outdoor pool from where it was “subsequently sold for disposal off base or mixed with fuel and burned on base.”

The pool was located on a hilltop near Kadena Marina, a popular recreation spot, and past tests revealing PCBs in the sea suggest contamination had spread from the base via groundwater or storm drains. The existence of the pool only came to light in 1998 when it was reported by a whistleblower, sparking an official investigation.





Environmental adviser Ikeda has criticized such disposal techniques. Burning contaminated oil, she explained, can lead to the inhalation of toxins and the resulting ash can pollute the soil. Ikeda also expressed concern for local waterways. “PCBs can build up in river bottoms and then enter shellfish, crustaceans, fish and the entire ecosystem of the seashore. Because PCBs are persistent and bio-accumulate, if people consume the fish over a long period of time, the levels increase in their bodies.”

In the 1990s, Kadena Air Base collected PCB-contaminated oil from “various locations on island” and leaks gave rise to a number of hot spots within the installation. Inside one mechanical room, contamination levels spiked at 17,000 mg/100cm<sup>2</sup>. The EPA’s decontamination requirement for indoor areas – even those where access is restricted – stands at 10 mg/100cm<sup>2</sup>.

In 1993, investigators were concerned that PCB contamination may have spread so they recommended sampling the Hija River, which supplies drinking water to the base and the surrounding communities. It appears no such tests were ever conducted.

As of 1999, the base only checked its drinking water for contamination from “PCBs and other constituents” once a year from a single tap. Water leaving the installation was only monitored four times a year. Today, the installation claims to test its water supply twice a year for PCBs and at specific intervals for other substances, for instance quarterly for arsenic and annually for lead. However the 2014 discovery of high levels of lead in water fountains in an education building and recent failures to warn on-base personnel of elevated PFOS levels have called into question the reliability of such tests.<sup>18</sup>



Photo caption: Tests for PCB contamination discovered levels 1700 times safe standards but the base only tested its drinking water once a year from a single tap.

Reports from the 1990s claimed PCB hot-spots on the base had been cleaned up – but these assurances appear false. In 2011, internal investigators slammed the base’s policies regarding PCBs as a “major deficiency”. They underlined the absence of a safe storage area for contaminated transformers and failures to label equipment deemed hazardous. According to the same report, in 2012, the installation had approximately 500 transformers but checks for PCBs had been conducted on less than half of them.

Recent reports reveal instances of transformers leaking and exploding. One email from August 2014 showed emergency teams’ frustrations after dealing with the third transformer leak within a two-week period.

### **108 barrels of toxic waste and the soccer pitch in Okinawa City**

One of Okinawa’s most serious environmental incidents in recent memory is the discovery of 108 barrels of toxic waste between 2013 and 2015 on land that was once part of Kadena Air Base.<sup>19</sup> The FOIA-released documents shed new light on the military’s role in the incident and USAF attempts to downplay its severity to parents whose children attend the adjacent Bob Hope Primary School and Amelia Earhart Intermediate School.

Piecing together a timeline of the incident from the reports, it appears that around 1964, the

military dumped barrels containing mixed hazardous waste into ravines on the outskirts of Kadena Air Base. Around 1980, the two schools were built in the vicinity and then in 1987, some nearby land was returned to civilian control. In 1996, local authorities constructed a soccer pitch on the site.

In June 2013, workers renovating the pitch unearthed dozens of the buried barrels, some of which contained high levels of dioxin. Although the discovery was within meters of the school playing fields, USAF officials did not inform teachers or parents. No dust control screens were erected to prevent the possible spread of contamination and, as excavation work went on nearby, American students were allowed to continue playing outdoors.

When military families finally learned about the toxic waste six months later, they were furious. In response, base officials conducted their first checks of the school grounds on December 31, 2013. However they only tested surface soil and did not conduct magnetic tests to ascertain whether any barrels lay buried beneath the school fields. In February 2014, USAF officials declared the school grounds safe but the laboratory test results – totaling 107 pages – have been entirely redacted from the FOIA documents.

Exacerbating suspicions of a cover-up was another announcement in February assuring service members that dioxin only caused the skin disease, chloracne, but “No other human health effects have been proven.” This contradicts EPA data that dioxin “can cause cancer, reproductive and developmental problems, damage to the immune system, and can interfere with hormones.”

In the following months, more barrels were unearthed on the returned land, reaching a total of 108. As well as dioxin, some of the barrels contained the herbicides 2,4,5-T and 2,4-D, arsenic and PCBs.



Photo caption: Crime scene photos: Some of the 108 barrels of toxic waste unearthed from former Kadena Air Base land.

In nearby water, dioxin levels peaked at 21,000 times safe levels. Due to the detection of the two herbicides, independent experts concluded Vietnam War era defoliants had been among the waste dumped there.

On July 8 2015, base officials sent out a one page memo concluding “appropriate measures will be taken” if they “become aware of any substantial impacts to the health or safety.” The contamination findings were attached – but it seems unlikely many parents read them.

Three days later, heavy rains flooded the dumpsite and the muddy water was pumped by Japanese construction crews into nearby waterways without any checks for contamination.<sup>20</sup> Flow maps suggest this water entered the base but, once again, the USAF decided not to inform its service members.

### **Contamination at Kadena Air Base: The human impact**

Okinawa’s pollution shares many similarities with contamination discovered on military bases in the U.S. In 2014, the EPA listed 141 Pentagon installations as Superfund sites in need of remediation and last year the Department of Defense reportedly ranked third



among the worst polluters of U.S. waterways.<sup>21 22</sup>

In one of the most publicized cases of contamination, tens of thousands of service members and their families were exposed to contaminated drinking water for decades at Camp Lejeune, North Carolina.

The basic problem is that nobody yet knows the full impact of military contamination on people living on or near the 130 U.S. bases in Japan. The Pentagon has repeatedly attempted to downplay the risks to service members and the Department of Veterans Affairs has not conducted any surveys.<sup>23</sup> Likewise Japan lacks a centralized disease control system which could identify spikes in certain illnesses among civilians living close to military installations.

However, some Americans are convinced that pollution from Kadena Air Base has destroyed their families' health.

"Kadena officials have known about this contamination the entire time but they will do whatever they can to keep it all hush-hush," said Telisha Simmons.

Simmons and her family were stationed at Kadena Air Base between 2011 and 2012. Before arriving on Okinawa, none of them had experienced any serious medical problems but during their time on the island, one of her sons developed a brain cyst and her daughter bone tumors; Simmons herself was diagnosed with a pituitary tumor and other serious illnesses which resulted in a hysterectomy at the age of 35. Her children attended Bob Hope Primary School and played regularly on its fields. "Kadena has not reached out to me at all concerning this problem," said Simmons.

Speaking on condition of anonymity because they feared for the careers of family members currently serving with the USAF, more than a dozen parents described severe illnesses among children who attended the two schools or played on their fields between 1999 and 2013. Illnesses include cancers, auto-immune, respiratory and neurological problems.

USAF officials have never investigated whether these illnesses are linked to pollution on the installation.

According to contamination expert Ikeda, children are particularly susceptible to toxic chemicals.

"An adult and a child can drink the same glass of water - but they can be affected differently because of their lower body weight. All of these substances found on Kadena Air Base - PCBs, lead, dioxin, PFOS - accumulate in children's organs, damaging their bodies in a variety of ways."

Due to inadequate checks of on-base drinking water supplies, the numbers of those exposed potentially stretch back for many years.

Paula Davidson and her family lived on Kadena Air Base in the 1980s. During this time, her two children developed illnesses that were later diagnosed as cancer. A third child, conceived on Okinawa and born in the U.S., fell sick with cancer of the brain. "I believe beyond a shadow of a doubt that being exposed to toxic chemicals on Okinawa caused his

illness.”

Two of her children died in their thirties. “Now that they have gone, I guess they have just become another statistic,” said Davidson.

Given the severity of contamination on Kadena Air Base, these cases may be the tip of the iceberg of health effects on both U.S. service members and their families and Okinawans living and working on and near the base. The FOIA-released documents reveal decades of dangerous exposure, including Okinawan farmers tending fields tainted with incinerated munitions, service members and base employees ordered to work among crumbling asbestos, civilians sold PCB-contaminated oil without warnings; and on-base residents and Okinawans drinking water containing PFOS, fuel and raw sewage.

If Kadena Air Base were located in the US, those exposed could demand an investigation from the EPA. But because of current regulations both Okinawans and Americans living in Okinawa are left uninformed, unprotected and with no recourse for justice.

“While supporting my husband in his military career, my children were poisoned,” said Simmons. “This is not the first time the U.S. government has covered up contamination on a military installation. Now it needs to unveil all the details so we can know exactly what we are dealing with.”

## **The military response**

On April 10, an earlier version of this article in The Japan Times detailed contamination at Kadena Air Base from perfluorooctane sulfonate (PFOS), lead and asbestos.

In response, USFJ provided the following comments.

Asked whether tests for PFOS contamination currently being conducted on 664 military bases in the U.S. would be extended to Japan, USFJ replied, “The service-wide survey... applies only to stateside bases.” They added that tests have “repeatedly determined that PFOS levels in drinking water at Kadena are well below the EPA’s suggested limits.” However, they did not provide comment on sampling which revealed contamination exceeding safe levels in a nearby river between 2014 and 2015, and on an on-base well in 2008.

In response to revelations that an incinerator had contaminated farmers’ fields with dangerous levels of lead, USFJ replied, “We do not keep records of notifications given to local farmers.” They denied depleted uranium munitions had been burned there because the incinerator “was used to dispose of small arms ammunition”. However, USFJ appeared not to have read the original 1994 report which also cited the burning of flares, starter motors and other “exotic pyrotechnics”.

USFJ also appeared not to possess documentation detailing the exposure of service members to asbestos during on-base war games. “We will be happy to examine any documentation you would like to share with us,” they wrote. To facilitate notification of service members exposed to asbestos, the reports have been forwarded to USFJ.<sup>24</sup>

On April 15, the following questions were emailed to USFJ.

- In 2011, inspectors called PCB-storage at Kadena Air Base a “major deficiency”. What steps has the installation taken since then to improve storage?
- Will USFJ investigate the spike in illnesses among children who attended Bob Hope Primary School and Amelia Earhart Intermediate School?
- Given the 6-month delay to inform on-base families of the discovery of toxic waste adjacent to these schools, has USFJ revised its notification policies?
- What resources are there for USAF service members and their families who believe that contamination (lead, PCBs, PFOS, dioxin, asbestos, arsenic) may have sickened themselves or their families?
- What assurances can you provide local residents that USFJ takes their concerns re: contamination seriously?

As of May 1, the only reply received was the following:

“To date, there has been no evidence that children attending Bob Hope Primary School and Amelia Earhart Intermediate School are at an increased risk of illness. 18th Wing has taken a proactive stance to evaluate potential environmental health hazards and protect the health of U.S. Forces personnel, their families and the local community.”

This is a revised and expanded version of two articles which first appeared in The Japan Times on April 10 and 17, 2016.

## Notes

<sup>1</sup>Data from Okinawa Prefecture available in Japanese [here](#) and [here](#).

<sup>2</sup>Data from Government of Japan Ministry of Defense available in Japanese [here](#).

<sup>3</sup>Masaaki Kameda, “U.S.-Japan environmental agreement on U.S. bases flawed, experts say,” The Japan Times, September 29, 2015. Available [here](#).

<sup>4</sup>See for example: Jon Mitchell, “Vietnam: Okinawa’s Forgotten War”, The Asia-Pacific Journal, Vol. 13, Issue 15, No. 1, April 20, 2015. Available [here](#).

<sup>5</sup>Ryukyu Asahi Housou, “Karehazai o abita shima”, May 15 2012.

<sup>6</sup>See for example [here](#).

<sup>7</sup>Department of Defense, “Japan Environmental Governing Standards,” December 2012. Available [here](#).

<sup>8</sup>Jon Mitchell, “FOIA Documents: Drunk US Marine’s 2015 dump of toxic foam among accidents polluting Okinawa water supply”, The Asia-Pacific Journal, Vol. 14, Issue 7, No. 3, April 1, 2016. Available [here](#).

<sup>9</sup>Ibid.

<sup>10</sup>Jennifer McDermott, “Military to check for water contamination at 664 sites,” Associated Press, March 10, 2016. Available [here](#).

<sup>11</sup>For more on the risks of lead contamination, see the WHO report available [here](#).

<sup>12</sup>For more information on asbestos, the WHO report is [here](#).

<sup>13</sup>"28 Japanese confirmed with asbestos injuries from working at U.S. bases", Kyodo, January 8 2014. Available [here](#).

<sup>14</sup>For example, see Jon Mitchell, "Okinawa – The Pentagon's Toxic Junk Heap of the Pacific," The Asia-Pacific Journal, Vol. 11, Issue 47, No. 6, November 25, 2013. Available [here](#).

<sup>15</sup>Jon Mitchell, "FOIA Documents Reveal Agent Orange Dioxin, Toxic Dumps, Fish Kills on Okinawa Base. Two Veterans Win Compensation, Many More Denied", The Asia-Pacific Journal, Vol. 13, Issue 39, No. 1, October 5, 2015. Available [here](#).

<sup>16</sup>Also see: Jon Mitchell, "Military Contamination on Okinawa: PCBs and Agent Orange at Kadena Air Base", The Asia-Pacific Journal, Vol. 12, Issue 12, No. 1, March 24, 2014. Available [here](#).

<sup>17</sup>For the EPA overview of the dangers of PCBs see [here](#).

<sup>18</sup>Erik Slavin, "Elevated lead levels found in some school, day care drinking fountains", Stars and Stripes, August 22, 2014.

<sup>19</sup>For example, see Jon Mitchell, "Kadena moms demand truth", The Japan Times, January 21, 2014. Available [here](#).

<sup>20</sup>Jon Mitchell, "What Lessons Can Vietnam teach Okinawa about U.S. Military Dioxin?", The Asia-Pacific Journal, Vol. 14, Issue 3, No. 2, February 1, 2016. Available [here](#).

<sup>21</sup>Alexander Nazaryan, "Camp Lejeune and the U.S. military's polluted legacy", Newsweek, July 16, 2014.

<sup>22</sup>Emerson Urry, "The Department of Defense Is the Third Largest Polluter of US Waterways", Truthout, February 15, 2016. Available [here](#).

<sup>23</sup>Jon Mitchell, "Agent Orange and Okinawa: the story so far", The Japan Times, April 28, 2016. Available [here](#).

<sup>24</sup>The full report is available to download [here](#).

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