Malawi Ratifies the Pelindaba Treaty

As of 1 July 2009, the African Nuclear-Weapon-Free Zone Treaty (Pelindaba Treaty) is one ratification away from entering into force. The Treaty will enter into force on the date of deposit of the 28th Instrument of ratification. With Malawi depositing its ratification instrument with the African Union (AU) on 28 April 2009, any of the remaining non-ratifying African states could do so, thereby claiming the honour of being the state that tipped the 13-year-old treaty into force.

9 years on, Libya still not free of chemical weapons

Syria’s regime says it will need at least a year to dismantle its chemical weapons arsenal, but if Libya’s experience is anything to go by, this is a hopelessly optimistic forecast.

Damascus has provided the Hague-based Organisation for the Prohibition of Chemical Weapons (OPCW) with a full inventory of its chemical arsenal, in order to avert US-led military strikes in line with a US-Russian deal.

The plan calls for Syria’s arsenal to be destroyed by mid-2014 amid hopes that it could pave the way for peace talks to end the 30-month Syrian conflict which has killed more than 110,000 people and forced two million more to flee abroad.

Syrian President Bashar Al-Assad said last week “it needs a year, or maybe a little bit more” and $1 billion for Syria to
surrender its chemical weapons.

But judging by the Libyan experience, that “little bit more” could stretch to years.

Nine years after Tripoli signed on to the Chemical Weapons Convention, the new authorities are still trying to destroy the remainder of the stockpile they inherited from slain dictator Moamer Kadhafi.

The process began early in 2004 when Kadhafi, keen to shake off Libya’s “pariah state” image, signed the Convention and joined the OPCW.

Libya had 13 tonnes of mustard gas when it signed the treaty, but the former regime claimed at the time to have destroyed the munitions needed to deliver the deadly substance.

In the years following the signing, Kadhafi’s regime destroyed around 54 percent of its mustard gas stocks and about 40 percent of the chemicals used to manufacture the substance, besides 3,500 bombs intended to deliver deadly chemicals.

The process, supervised by OPCW experts, was interrupted by the 2011 uprising against Kadhafi in which he was ultimately toppled and slain by Western-backed rebels.

The experts’ work resumed in 2012.

“The process of elimination is being conducted step-by-step, with the latest stage of the destruction of chemicals taking place between December, 2012 and May, 2013,” said Colonel Ali Chikhi, spokesman for the Libyan army staff.

To date, he told AFP, “Libya has destroyed 95 percent of its mustard gas stocks and is on course to eliminate the remainder by 2016 at the latest”.

The largest stockpile of the gas is inside a warehouse in the city of Al-Raogha, around 700 kilometres (435 miles) south of
the capital Tripoli.

“Chemical substances stored in warehouses are strictly monitored and subject to draconian controls by Libya and the international community,” said Chikhi.

Libyan Foreign Minister Mohamed Abdelaziz, meanwhile, told AFP that agreement had been reached with the United States earlier this month for technical help in destroying the remainder of Libya’s chemical weapons.

Abdelaziz added that a team of US experts was expected in the country in the next few days.

Washington, the minister added, will meet 80 percent of the costs for the operation while Germany will pick up the shortfall. Latest technologies will be used to prevent the environment being impacted in any way.

Abdelaziz stressed that the project envisages destroying only “mustard gas and chemical products considered toxic and dangerous”. For the moment, Libya’s stocks of concentrated uranium, or yellowcake, will not be touched.

At the end of 2011, in the aftermath of the revolution that toppled Kadhafi, a large stock of yellowcake was discovered at an arms depot in the city of Sabha, in southern Libya.

“Libya is trying to determine if the concentrated uranium can be used for peaceful nuclear energy purposes or sold to countries which use the product for peaceful purposes,” said the minister.

The stockpile has since been secured in collaboration with International Atomic Energy Agency inspectors.

But the Centre for Strategic Studies in Tripoli has asked the Libyan authorities to ensure the concentrated uranium is used for the benefit of Libyans, in “industrial and agricultural development and in the production of clean energy”.
Reanalysis of 1883 Observations Suggests a Billion-Ton Comet Buzzed Earth

On 12 August 1883 at 8:00 a.m., Mexico’s Zacatecas Observatory’s boss Jose A. Bonilla was preparing to study the Sun’s corona when he observed an amazing phenomenon. He saw several distant objects that were close together and crossing the solar disc. In the space of two hours, while the sky was clear and he was able to observe, he counted up to 283 bodies that crossed in the angular field of view of the projection lens. Between 8:00 a.m. on August 12 and 8:40 a.m. on August 13, 1883, Bonilla counted a total of 447 objects in the course of 3 hours 25 minutes of clear sky observation windows. That is an average of 131 objects per hour, meaning a total of 3275 objects must have passed the solar disk within 25 hours.

Geometry of Bonilla’s observation: Z (Zacatecas), M (Mexico City or Puebla)
and $O$ is the point at which objects were observed. $D$ is the distance from the Zacatecas Observatory to the objects and $d$ is the distance between Zacatecas and Puebla or between Zacatecas and Mexico City (Credits: Hector Javier Durand-Manterola, María de la Paz Ramos Lara, and Guadalupe Cordero).

In 1886, without providing a hypothesis to explain the phenomenon, Bonilla published his report in the French L’Astronomie magazine. “Their time intervals were variable, a body passing through would not take more than one third, half a second, or at most one second to cross the disc, and a minute or two passed before others appeared – some passed as 15 or 20 at once, so that was difficult to count them,” Bonilla reported. “I drew the trajectory of many of these bodies on the solar disc, marking their ‘entrances’ and ‘exits’ on the paper.”

At the time, there were several theories to try to explain the phenomenon, but none was very conclusive. The magazine’s editor used the “flock of bird” theory as a plausible explanation: he assumed that the objects could have been birds that crossed in front of Bonilla’s telescope. The fragmenting of previously observed comets in the same year, 1883 I (Brooks-Swift) and 1883 II (Pons-Brooks), could not explain Bonilla’s objects. Other astronomers adopted Bonilla’s event as the first evidence of unidentified flying objects (UFOs).

It was more than a hundred years later that scientists figured out what probably happened. A recent reanalysis of the observations by Hector Javier Durand-Manterola and two others
at the National Autonomous University of Mexico in Mexico City show the event was a low-probability/high-risk event. They think the objects Bonilla recorded were fragments of a billion-ton comet that had recently been broken up in an approach almost flush with the Earth’s surface. They posit that the objects were fragments of a comet based on Bonilla’s description that the bodies “appeared dark-black and perfectly round and some more or less elongated when seen against the solar disc, became bright images as they left its edges and moved across the outer field of the lens.” The authors add that their premise is appropriate “because the only bodies in the Solar System which are surrounded by a bright mistiness are comets.”

Strangely, it appears no one else on the planet observed those fragments or the comet passing in the face of the Sun. In fact Bonilla noted in his report that the phenomenon was invisible to the nearest observatories of Mexico City and Puebla, which were just a few hundred kilometers away and were informed of the event after his first observation on August 12th. Manterola and his colleagues explain the invisibility using parallax. They point out that if, according to Bonilla’s information, the objects were invisible to observers at Puebla and Mexico City, then the fragments must have been close to Earth such that the objects would have been in line with the Sun only when viewed from Zacatecas. Parallax would have ensured that the objects were not aligned with a visual to the Solar Disc for other observers including those from Sahara, northern India and South-East Asia, that are located along the same latitude as Mexico.

The authors have used the invisibility aspect to place limits on how close to Earth’s surface the fragments must have been: between 500 km and 8000 km. That range lies in low Earth orbit (LEO) where, today, it could pose serious collision risk to active communication and observation satellites. More so, a few thousand kilometers from Earth is quite small when
compared to astronomical distances. Imagine a Bonilla fragment at that distance and travelling at a velocity somewhere between 15 and 75 km/s, the velocity of meteors when entering Earth’s atmosphere: it is like a bullet grazing your head so close it shaves off some hair.

There is more to Manterola et al.’s deductions. They estimate that the widths of those objects must have ranged in size from 50 to 800 meters and their lengths from 70 to 1000 meters, which coincides with the values measured for the fragments of 73P/Schwassmann-Wachmann 3 comet which broke apart as it reentered the inner Solar System in 2006. In their analysis, they estimate that the mass of the comet before fragmentation was huge, a billion tons or more, approaching the mass of Halley’s Comet.

Tunguska region in 1938: Portion of one of the photos from Kulik’s aerial photographic survey (1938) of the Tunguska region. The parallel fallen trees indicate the direction of the blast wave. About 2150 square kilometres of Siberian taiga were devastated and 80 millions trees were overturned (Credits: University of Bologna).
The reanalysis of Bonilla’s data is an eye opener regarding the threat of low probability/high risk events. The authors spell out in their paper that these Bonilla’s fragments were close to impacting Earth. They state that “the calculated size of the objects is greater than or of the same order of the object which produced the Tunguska event. So if they had collided with Earth we would have had 3275 Tunguska events in two days, probably an extinction event.”

The Tunguska event was a large explosion over northern Russia in 1908 and it is the only entry of a large meteoroid in the modern era with first-hand accounts. The generally agreed upon theory is that the Tunguska event was produced by a 100 million kg space rock 60 m across that entered the Earth’s atmosphere and detonated at an altitude of 8500 m above Siberia, producing a fireball and releasing energy equivalent to about 185 Hiroshima bombs. That could’ve wipe out the largest metropolitan city with a population of about 33,000,000 had it been anywhere in the vicinity.

Now imagine 3275 Bonilla fragments, each with a destructive power equivalent to 185 Hiroshima bombs, all hitting Earth within two days. That would be a total destructive power of over 600,000 Hiroshima bombs, enough to wipe out Earth’s entire population today. An impact in water near a city could have created a dangerous tsunami. It seems Earth narrowly avoided an extinction event just over a hundred years ago.

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Russian Meteor Explosion vs. Hiroshima Bomb

On February 15 at 3:20:26 UTC, a supersonic flying space rock, roughly the size of a van or a small truck, entered Earth’s atmosphere, exploded at 24,140 meters over Russia’s Chelyabinsk, and produced a total destructive blast power of 500 kilotons. This means the destructive power yield was 30 times the blast yield of the U.S. atomic bomb, named Little Boy, that was dropped on the Japanese city of Hiroshima in 1945. But what does that actually mean? Is the Russian meteor impact actually worse than the destruction of Hiroshima?

As expected for a typical meteor, the Russian meteor burned up as it tore through Earth’s atmosphere, producing destructive blast waves and sonic booms. The energy was powerful enough to shatter countless windows, dishes, and televisions in people’s homes. The shock wave damaged about 3,000 residential buildings in the rural city and injured 1,200 people, Chelyabinsk city officials estimated. Most of the injuries were caused by shattering glass. At a zinc factory, part of the roof collapsed. However, that damage and injury from a 500-kiloton yield explosion is much less compared to the instantaneous mass destruction and indiscriminate mass slaughter that was caused by the heat ray, blast, and radiation of the 16-kiloton Hiroshima bomb.

Compared to the atomic bomb that was detonated at 580 meters above Hiroshima, the Russian meteor disintegrated over Siberia at altitudes 40 times that of the Hiroshima detonation, but generated destructive power equivalent to 30 Hiroshima bombs. The fierce heat ray, powerful nuclear radiation, and tremendous blast from the Hiroshima detonation instantaneously destroyed 60,000 of 90,000 buildings, killed about 140,000 people, and injured more than 100,000 within a radius of
59,545 meters from the epicenter. Absence of powerful nuclear radiation in the meteor explosion means that thermal and sonic were the dominant energies. As with nuclear detonations, intensity of thermal energy, which generates blast energy as the rising temperature expands the surrounding air, plummets with decreasing altitude. Consequently, blast energy generated is reduced the further it travels. Furthermore, the meteor disintegrated multiple times, over a long distance, and at various altitudes. Therefore, the atmosphere largely protected the Earth this time, heating up the meteoroid and causing it to break apart. Luckily, “the atmosphere absorbed the vast majority of that energy,” said Amy Mainzer, a scientist at NASA’s Jet Propulsion Laboratory.

Ultimately, the destructive power yield from meteor explosions over Chelyabinsk on Friday exceeds that of the U.S. uranium-235 gun-type bomb that was dropped on the Japanese city of Hiroshima during the World War II but the bomb destroyed buildings, killed and injured humans to a much greater extent than did the meteor explosions. This is because about 15% of the energy in nuclear detonation is powerful nuclear radiation, causing immediate death and severe injury to human organs; this is absent in meteor explosions. Moreover, the Hiroshima bomb was detonated at a lower atmospheric altitude that had been tested and selected to maximize the bomb’s destructive power, but the meteor disintegrated spontaneously, at multiple times and at higher altitudes that rendered the destructive power less effective. If that 17-meter wide, 9-million kilogram meteor, 18 kilometers each second, were to wholly crash into the most populated U.S. city New York, the physical destruction and human catastrophe would be enormous. The blast waves and sonic boom could have instantly destroy roughly 9,000 of 13,000 buildings, killed and injured around 5 million of the 8 million people in New York City. That would be a natural disaster of epic proportion, and the Russian meteor event demonstrates that such a disaster is real and it could one day
OCPW Provides Somalia Assistance to Begin CWC Implementation

The OPCW organised a special 2-day induction programme on 12 and 13 September 2013 for a group of senior government representatives from the Federal Republic of Somalia to assist country’s implementation of the Chemical Weapons Convention (CWC).

The delegation was headed by H.E. Ambassador Yusuf Mohamed Ismail Bari-Bari, Permanent Representative of Somalia to the United Nations in Geneva, together with Mr Mohamed Sheik Hassan Hamud, Member of the National Security Advisory Team, and Mr Mohamed Ali Jama, Senior Security Advisor to the Prime Minister.

Somalia acceded to the CWC on 29 May of this year and the treaty came into force 30 days later on 28 June, thereby making Somalia the CWC’s 189th State Party. This is the first time that officials from Somalia visited the OPCW and attended a programme as representatives of a State Party.
The Deputy Director-General, Mrs Grace Asirwatham, welcomed the delegation on behalf of the Director-General and expressed the readiness of the OPCW Technical Secretariat to assist by all means Somalia’s implementation efforts. Thanking the Secretariat for organising the induction programme, the Somali delegation sought the cooperation and assistance of the OPCW in order to enhance the necessary capacity of Somalia to implement the CWC.

The programme included elements on rights and obligations of States Parties under the Convention, initial implementation measures for a new State Party, international cooperation and assistance functions of the Technical Secretariat, verification-related national requirements, and the overall institutional setup and operations of the OPCW. The delegation also paid a visit to the OPCW Laboratory.