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## ON THE LEGALITY OF ANY OTHER NUCLEAR EXPLOSION

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Numerous so-called asteroid impact mitigation techniques have been and continue to be discussed. The range of proposed measures goes from gravity tractors to destruction or deflection of asteroids through nuclear explosions.

Especially when faced with very large objects and only a short warning time, the latter option – namely the nuclear one – might be one of the few feasible options.<sup>1</sup>

But the deployment of nuclear explosive devices to counter incoming NEOs faces several legal questions. International law has certain reservations against nuclear weapons in space. The 1967 Outer Space Treaty forbids to station nuclear weapons or other weapons of mass destruction in Earth orbit, on the Moon or other celestial bodies or otherwise in outer space. Further, the Partial Test Ban Treaty forbids nuclear test explosions in space. Now, it can be argued that nuclear explosives used for planetary defence are not weapons<sup>2</sup> and that an operational planetary defence mission is not a test. But the wording of the NPT applies to nuclear weapons tests and to “any other nuclear explosion.”

Yet, from historical, legal and political perspectives, several arguments can be made that such an operation would still be legal. A further look will be given at options to create more legal clarity.

The Partial Test Ban Treaty – formally the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space, and Under Water – prohibits nuclear test explosions in outer space. This should not constitute an impediment to any planetary defence undertaking because such an operation would not be a weapon test for several reasons. First, a nuclear explosive device employed on a planetary defence mission is not a weapon. While it can, of course be used as such, its employment is in fact comparable to a number of cases where explosives are used for peaceful and specifically non-military purposes such as mining, construction of tunnels but also very specifically to defuse threats from

natural phenomena (for example avalanches). Explosives can for example be dropped from aircraft or fired from cannons to trigger avalanches before they become too dangerous. The airborne method is regularly carried out in the Austrian and German Alps.<sup>3</sup> In other instances, canons are used for this purpose. The employment of cannons – basically classical artillery weapons – further blurs the line between weapons and tools to provide comfort and safety in absolutely non-violent and non-stratified circumstances.<sup>4</sup>



<https://www.swisshelicopter.ch/de/aktuelles/721-lawinensprengen-einmuss-fuer-die-sicherheit>

The employment of artillery – mortars, howitzers, rocket artillery and the like – is comparably common in places like Switzerland and the United States. One very notable – if not notorious – example can be found in Mammoth, California. There, a World War II era howitzer is used to fire artillery rounds into snow-covered slopes in order to trigger avalanches in a controlled way before they become too dangerous.<sup>5</sup>

<sup>3</sup><https://www.heli-austria.at/heli-austria/angebot-leistungen/lawinensprengung-praezise-sprengung.html> - retrieved 2025 04 07

<sup>4</sup><https://www.wifi.at/kursbuch/technik-technische-gewerbe/arbeitnehmerschutz--sicherheitstechnik/sprengarbeiten/lawinenausloese-sprengarbeiten/lawinenausloese-sprengarbeiten-wifi-lehrgang> - retrieved 2025 04 12

<sup>5</sup><https://www.20min.ch/story/lawinen-sprengen-mit-weltkriegs-haubitze-956132988761> - retrieved 2025 04 13

<sup>1</sup> Nina-Louisa Remuss, Space and security, in: Brünner/Soucek, Outer Space in Society, Politics and Law. Vienna New York 2011, 553

<sup>2</sup> Alexander Soucek, International Law. In: Brünner/Soucek, Outer Space in Society, Politics and Law, Vienna New York 2011, 320



<https://www.20min.ch/story/lawinen-sprengen-mit-weltkriegs-haubitze-956132988761>

Would the employment of nuclear explosive devices against NEOs violate Art.IV OST? Such a device is not necessarily placed in orbit or installed in outer space.<sup>6</sup> The treaty does, further, not technically prohibit the actual use of a nuclear explosive device in outer space.<sup>7</sup> The destruction and/or deflection of an asteroid does not necessarily constitute “use” of a celestial body. Therefore, Art IV para 2 OST would not be infringed either.<sup>8</sup>

But the wording of the NPT applies to nuclear weapons tests and to “any other nuclear explosion.”. Although the intention behind this was mainly included in the text because of verification issues and the problem of cross-border fall-out, the issue cannot be fully ignored.<sup>9</sup> As had been explained by the then Acting Secretary of State Ball in a subsequent report to President Kennedy, “The phrase ‘any other nuclear explosion’ ... are prohibited by the Treaty because of the difficulty of differentiating between weapon test explosions and peaceful explosions without additional controls.”<sup>10</sup> One could further argue that such a nuclear blast to deflect or destroy a NEO is not taking place at any place under [any state’s] jurisdiction and control. An asteroid being a celestial body is, therefore, by definition not under any state’s jurisdiction and control which may render the provision mute in this context.<sup>11</sup>

Article 32 of the Vienna Convention, Supplementary Means of Interpretation, provides:

Recourse may be had to supplementary means of interpretation, including the preparatory work of the treaty and the circumstances of its conclusion, in order to confirm the meaning resulting from the application of

article 31, or to determine the meaning when the interpretation according to article 31:

(a) leaves the meaning ambiguous or obscure; or

(b) leads to a result which is manifestly absurd or unreasonable.<sup>12</sup>

Not only was the question of planetary defence most likely not envisaged by the drafters of the PTBT but the prohibition of other nuclear explosions was included in the specific context of verification and cross-border contamination. The latter is of secondary importance in outer space.

The argument can be made that paragraph 1 PTBT was not intended to preclude a planetary defence mission that aims to actually prevent wide-spread destruction on our planet. In a sense, such an interpretation would actually defeat the purpose and negate the spirit of the PTBT.

The prohibition of nuclear explosions in outer space under the Comprehensive Test Ban Treaty is currently not applicable as the treaty has not entered into force yet and is rather unlikely to do so in the foreseeable future.

How could we create more legal certainty? It may be sensible if the UN Security Council authorized a concerted effort to mitigate an imminent asteroid threat. The current international cooperative efforts in the field of planetary defence such as IAWN and SMPAG could further evolve. One might envisage one day an international legal instrument specifically dealing with planetary defence. This seems, however, not too likely under the current geopolitical environment.

At the end of the day, space powers with the necessary means may decide that they have to do what they have to do to save lives on Earth. The question remains whether this would be a desirable situation from a space law perspective.

<sup>6</sup> Neumann/Schrogl in: Hobe Stephan /Bernhard Schmidt-Tedd/Kai-Uwe-Schrogl (eds), Cologne Commentary on Space Law, Vol.1, Cologne 2009, 79

<sup>7</sup> Neumann/Schrogl in: Hobe Stephan /Bernhard Schmidt-Tedd/Kai-Uwe-Schrogl (eds), Cologne Commentary on Space Law, Vol.1, Cologne 2009, 81

<sup>8</sup> Ibid.

<sup>9</sup> <https://2009-2017.state.gov/t/avc/trty/199116.htm> - retrieved 2025

<sup>10</sup> Ibid.

<sup>11</sup> James A. Green, Planetary Defense: Near-Earth Objects, Nuclear Weapons and International Law, 42 Hastings Int'l & Comp. L. Rev. 1 (2019)

<sup>12</sup> <https://www.acerislaw.com/context-in-treaty-interpretation/> - retrieved 2025 04 13

