WHO PAYS? THE CONSEQUENCES OF STATE VERSUS OPERATOR LIABILITY WITHIN THE CONTEXT OF TRANSBOUNDARY ENVIRONMENTAL NUCLEAR DAMAGE

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INTRODUCTION

A nuclear power plant has the potential to inflict significant environmental damage[1] on both the state in which it is situated and neighboring states. This naturally raises the question of who must bear the costs of remediating any environmental harm. When a nuclear accident has only national repercussions, the various nuclear liability conventions provide a relatively straightforward answer as to who pays—the nuclear operator. And if that nuclear operator's assets are insufficient to cover all environmental clean-up costs, then the state itself would likely provide additional funds to clean-up its own environment. The established legal regime is generally effective at both allocating responsibility and ensuring effective compensation after accidents that have only domestic implications.

Yet the existing liability regime does not provide as much clarity when dealing with significant nuclear accidents that cause cross-border environmental harm. Assume, for instance, that a privately owned French nuclear power plant has a severe accident causing extensive radioactive contamination in the Black Forest, requiring Germany to undertake a very expensive clean-up effort. Although the nuclear liability conventions purport to channel all legal liability to the private operator, it is possible—if not likely—that the clean-up costs would exceed both the nuclear operator's insurance coverage and its assets. Germany could bear the remaining clean-up costs itself. Or Germany could pursue a government-to-government claim against France to recover any remaining costs.

Germany *should* be able to prevail in such a claim. But any German legal victory would likely entail years of complicated

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1 This Article views *environmental damage* as consisting of damage to the environment *per se—i.e.*, damage distinct and independent from any economic loss or personal injury. Some examples include: loss of biodiversity, damage to wildlife, effects on air or water quality, aesthetic harm, etc. Such damage can coincide with commercial loss, but it can also exist independently.

litigation. And—as Part I of this Article will show—it would run contrary to the principles underlying the nuclear liability conventions, which strive to ensure efficient and predictable compensation after a nuclear accident. Part I of this Article describes how the nuclear liability conventions deal with nuclear accidents that have cross-border environmental implications. These conventions are workable when addressing minor-to-moderate nuclear accidents that cause relatively minimal amounts (under 1 billion USD) of cross-border environmental damage. But they become increasingly untenable when addressing significant nuclear accidents that have costly cross-border effects. The shortcomings of the existing liability regimes discussed in Part I lead to the discussion in Part II about whether public international law can step into the breach left by the nuclear-liability conventions. It probably can, but uncertainties abound.

I. OPERATOR LIABILITY UNDER THE LIABILITY CONVENTIONS

Over the past decades, the international community has established various nuclear liability regimes to deal with nuclear accidents' costly effects. These regimes take the form of international conventions, and their purpose is to ensure that: 1) adequate compensation exists if an accident occurs; 2) the rules regarding nuclear liability and compensable damage are clearly established before an accident occurs; 3) all potential victims—including victims in other countries—are able to get to the courtroom; and 4) all potential victims receive compensation in an efficient manner.[2] In addition, these conventions serve to harmonize national legislation so that the rules regarding liability are similar across various jurisdictions.[3] Four conventions addressing nuclear liability are currently in force:

- Paris Convention on Third Party Liability in the Field

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2 *See generally* Julia A. Schwartz, *Liability and Compensation for Third Party Damage Resulting from a Nuclear Incident*, *in* INTERNATIONAL NUCLEAR LAW: HISTORY, EVOLUTION, AND OUTLOOK 307 (Luis Echávarri & Philippe eds. 2010), www.oecd-nea.org/law/isnl/10th/isnl-10th-anniversary.pdf; *see also* Int'l Atomic Energy Agency [IAEA], *The 1997 Vienna Convention on Civil Liability for Nuclear Damage and the 1997 Convention on Supplementary Compensation for Nuclear Damage — Explanatory Texts*, at 17, IAEA Doc. STI/PUB/1279 (2007), http://www-pub.iaea.org/MTCD/publications/PDF/Pub1279_web.pdf ("[T]he principle of non-discrimination and equal treatment of victims is often considered to be one of the basic principles of the nuclear liability regime.").

3 IAEA, *supra* note 2, at 6.

of Nuclear Energy;[4]

- Brussels Supplementary Convention;[5]
- Vienna Convention on Civil Liability for Nuclear Damage;[6] and

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4 Convention on Third Party Liability in the Field of Nuclear Energy, July 29, 1960, and Additional Protocol, Jan. 28, 1964, 956 U.N.T.S. 251; Protocol to Amend the Convention on Third Party Liability in the Field of Nuclear Energy, Nov. 18, 1982, 1519 U.N.T.S. 329. The OECD's Nuclear Energy Agency has a consolidated version of the Paris Convention with its 1964 and 1982 amendments. *Convention on Third Party Liability in the Field of Nuclear Energy of 29th July 1960, as amended by the Additional Protocol of 28th January 1964 and by the Protocol of 16th November 1982*, NUCLEAR ENERGY AGENCY, https://www.oecd-nea.org/law/nlparis_conv.html (last updated July 30, 2015) [hereinafter Paris Convention Consolidated Text]. A 2004 protocol to amend the Paris Convention is not yet in force. *See* Protocol to Amend the Convention on Third Party Liability in the Field of Nuclear Energy, Feb. 12, 2004, www.oecd-nea.org/law/paris_convention.pdf [hereinafter Paris Convention Amendments of 2004]. (Citations to the Paris Convention Amendments of 2004 will refer to the articles modified by the Amendments rather than the sections of the Amendments themselves. For example, section I.H of the Amendments replaces article 7 of the Paris Convention, so this Article will refer to it as article 7 of the Paris Convention Amendments of 2004.)

5 Convention Supplementary to the Paris Convention on Third Party Liability in the Field of Nuclear Energy, Jan. 31, 1963, and Additional Protocol, Jan. 28, 1964, 1041 U.N.T.S. 358; Protocol to Amend the Convention Supplementary to the Convention on Third Party Liability in the Field of Nuclear Energy, Nov. 16, 1982, 1650 U.N.T.S. 446. The OECD's Nuclear Energy Agency has a consolidated version of the Brussels Supplementary Convention with its 1964 and 1982 amendments. *Convention of 31st January 1963 Supplementary to the Paris Convention of 29th July 1960, as amended by the additional Protocol of 28th January 1964 and by the Protocol of 16th November 1982 ("Brussels Supplementary Convention")*, NUCLEAR ENERGY AGENCY, https://www.oecd-nea.org/law/nlbrussels.html (last visited Oct. 11, 2016) [hereinafter Brussels Supplementary Convention Consolidated Text]. A 2004 protocol to amend the Brussels Supplementary Convention is not yet in force. *See* Protocol to Amend the Convention Supplementary to the Paris Convention on Third Party Liability in the Field of Nuclear Energy, Feb. 12, 2004, www.oecd-nea.org/law/brussels_supplementary_convention.pdf [hereinafter Brussels Supplementary Convention Amendments of 2004]. (Similarly to the Paris Convention Amendments of 2004, as described *supra* note 4, this Article will refer to the Brussels Supplementary Convention Amendments of 2004 by reference to the articles that are amended rather than the sections of the Amendments.)

6 Vienna Convention on Civil Liability for Nuclear Damage, May 21, 1963, 1063 U.N.T.S. 265; Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage, September 12, 1997, 2241 U.N.T.S. 270. The consolidated text of the Vienna Convention and its Amendments can be found in IAEA, *supra* note 2, at 127–40 [hereinafter Vienna

- Convention on Supplementary Compensation for Nuclear Damage.[7]

The Paris and Brussels Supplementary Conventions are inextricably linked together because only parties to the Paris Convention can accede to the Brussels Supplementary Convention.[8] Further, the Paris/Brussels regime is essentially a Western European liability regime.[9] By contrast, both the Vienna Convention and the Convention on Supplementary Compensation are global conventions—any state is free to join.

The Paris, Brussels, and Vienna Conventions have all been amended at various times, but the Convention on Supplementary Compensation, being a newer convention, has not been amended.[10] In this Article, I focus exclusively on the consolidated convention text that comes from the latest Conventions, including the amended Paris and Brussels Conventions, which have not yet entered into force (but are expected to enter into force very soon).

A. *Environmental Damage under the Nuclear Liability Conventions*

The amended Paris Convention, amended Vienna Convention,

Convention Consolidated Text].

7 Convention on Supplementary Compensation for Nuclear Damage, September 12, 1997, 36 I.L.M. 1473 [hereinafter Convention on Supplementary Compensation]. This Convention entered into force on April 15, 2015. *See* Miklos Gaspar, *Convention on Supplementary Compensation for Nuclear Damage Enters into Force*, IAEA (Apr. 15, 2015), https://www.iaea.org/newscenter/news/convention-supplementary-compensation-nuclear-damage-enters-force.

8 In this regard, it may be helpful to view the Brussels Supplementary Convention, *supra* note 5, as a subsidiary of sorts to the Paris Convention, *supra* note 4, although there is a slight distinction between the Paris Convention and the Brussels Supplementary Convention in terms of whether the installation state has any responsibility for paying compensation.

9 The Paris Convention is technically open to all OECD members by simple accession; non-OECD states can accede only with the unanimous consent of all contracting parties. Paris Convention Consolidated Text, supra note 4, at art. 21. To date, however, only the Western European members of OECD have joined the Paris Convention. *Paris Convention on Nuclear Third Party Liability: Latest Status of Ratifications or Accessions*, NUCLEAR ENERGY AGENCY, https://www.oecd-nea.org/law/paris-convention-ratification.html (last updated July 30, 2015).

10 The Paris Convention was amended in 1964, 1982, and 2004. *See supra* note 4. The Brussels Supplementary Convention was amended in 1964, 1982, and 2004. *See supra* note 5. The Vienna Convention was amended in 1997. *See supra* note 6.

and the Convention on Supplementary Compensation[11] all include nearly identical definitions of *nuclear damage*.[12] Broadly speaking, the three Conventions define *nuclear damage* to consist of four components: 1) personal injury or property loss; 2) economic loss arising from personal injury or the property loss; 3) environmental harm, as well as any loss of income deriving from a direct economic interest in any use or enjoyment of the environment; and 4) preventive measure costs.

The broad array of consequences that fall under the nuclear damage rubric ensures that environmental damage—even in the absence of any commercial harm—qualifies as a compensable damage. The Conventions all say that claimants can recover "the

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11 The amended (2004) Brussels Supplementary Convention does not contain any definition of *nuclear damage*, but because it is a supplement to the Paris Convention, the nuclear damage definition from the Paris Convention would apply. Brussels Supplementary Convention Consolidated Text, *supra* note 5, art. 1.

12 The Vienna Convention Consolidated Text, *supra* note 6, at 128, art. I(1)(k), and the Convention on Supplementary Compensation, *supra* note 7, at art. I(f), both define *nuclear damage* to mean:

> (i) loss of life or personal injury;
> (ii) loss of or damage to property;
> (iii) and each of the following to the extent determined by the law of the competent court:
> (iv) economic loss arising from loss or damage referred to in sub-paragraph (i) or (ii), insofar as not included in those sub-paragraphs, if incurred by a person entitled to claim in respect of such loss or damage;
> (v) the costs of measures of reinstatement of impaired environment, unless such impairment is insignificant, if such measures are actually taken or to be taken, and insofar as not included in sub-paragraph (ii);
> (vi) loss of income deriving from an economic interest in any use or enjoyment of the environment, incurred as a result of a significant impairment of that environment, and insofar as not included in sub-paragraph (ii);
> (vii) the costs of preventive measures, and further loss or damage caused by such measures;
> (viii) any other economic loss, other than any caused by the impairment of the environment, if permitted by the general law on civil liability of the competent court.

The Paris Convention Amendments of 2004, *supra* note 4, at 16, art. 1(a)(vii), contain an identical definition of *nuclear damage*, except they exclude the head of damage listed in sub-article (vii) above. This exclusion is because the Paris Convention drafters believed that this type of economic loss was already covered by the other heads of damage. Schwartz, *supra* note 2, at 334.

costs of measures of reinstatement of impaired environment, unless such impairment is insignificant . . . ."[13] *Measures of reinstatement* is further defined in the Conventions to mean "any reasonable measures which have been approved by the competent authorities of the State where the measures were taken, and which aim to reinstate or restore damaged or destroyed components of the environment, or to introduce, where reasonable, the equivalent of these components into the environment."[14] Finally, the Conventions define *reasonable measures* to include "measures which are found under the law of the competent court to be appropriate and proportionate," taking into account "the nature and extent of the nuclear damage incurred or . . . the extent to which, at the time they are taken, such measures are likely to be effective; and relevant scientific and technical expertise."[15]

These cascading definitions leave significant discretion to the competent court, which is generally going to be located in the same state where the accident occurred.[16] Under the Conventions, the competent court has the ultimate authority to determine whether a proposed reinstatement measure is "reasonable"—and hence recoverable.[17] And, under the Conventions, the competent court will look towards environmental clean-up standards in domestic law that clarify what constitutes a "reasonable

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13 Vienna Convention Consolidated Text, *supra* note 6, at 128, art. I(1)(k)(iv); Convention on Supplementary Compensation, *supra* note 7, art. I(f); Paris Convention Amendments of 2004, *supra* note 4, at 16, art. 1(a)(vii). Here, I assume that any impairment will be significant, and so the conventional exclusion for "insignificant" environmental harm will not apply.

14 Vienna Convention Consolidated Text, *supra* note 6, at 128, art. I(1)(m); Convention on Supplementary Compensation, *supra* note 7, art. I(g); Paris Convention Amendments of 2004, *supra* note 4, at 16, art. 1(a)(viii).

15 Vienna Convention Consolidated Text, *supra* note 6, at 128–29, art. I(1)(o); Convention on Supplementary Compensation, *supra* note 7, art. 1(*l*); Paris Convention Amendments of 2004, *supra* note 4, at 16, art. 1(a)(x).

16 The Conventions provide that exclusive jurisdiction vests in the courts of the Contracting Party within whose territory the nuclear incident occurs. Vienna Convention Consolidated Text, *supra* note 6, at 136, art. XI; Paris Convention Consolidated Text, *supra* note 4, at art. 13; Convention on Supplementary Compensation, *supra* note 7, at art. XIII.

17 Paris Convention Amendments of 2004, *supra* note 4, at 16, art. 1(vii)–(viii); Vienna Convention Consolidated Text, *supra* note 6, at 128, art. I(1)(k), (m); Convention on Supplementary Compensation, *supra* note 7, art. I(f)–(g).

remediation" of the contaminated environment.[18] In the United States, for instance, a federal court has explained in an analogous context that "reasonable remediation" includes:

> The cost reasonably to be incurred by the sovereign or its designated agency to restore or rehabilitate the environment in the affected area to its pre-existing condition, or as close thereto as is feasible without grossly disproportionate expenditures. The focus in determining such a remedy should be on the steps a reasonable and prudent sovereign or agency would take to mitigate the harm done by the pollution, with attention to such factors as technical feasibility, harmful side effects, compatibility with or duplication of such regeneration as is naturally to be expected, and the extent to which efforts beyond a certain point would become either redundant or disproportionately expensive.[19]

But other states may have different standards and rules, and this is one area where the Conventions do not require harmonization across various jurisdictions.[20]

Further, if the damaged environmental components cannot be restored or reinstated, then the competent court will have to determine whether any "equivalent [environmental] components" exist.[21] In the United States, that same court suggested that alternatives to restoration may include "acquisition of comparable lands for public parks or . . . reforestation of a similar proximate

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18 This is because the conventions define "reasonable measures" to include those "measures *which are found under the law of the competent court* to be appropriate and proportionate . . . ." Paris Convention Amendments of 2004, *supra* note 4, at 16, art. 1(x); Vienna Convention Consolidated Text, *supra* note 6, at 128–29, art. 1(o); Convention on Supplementary Compensation, *supra* note 7, art. I(*l*).

19 Puerto Rico v. SS Zoe Colocotroni, 628 F.2d 652, 675 (1st Cir. 1980).

20 *See* Vedran Soljan, *The New Definition of Nuclear Damage in the 1997 Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage*, *in* REFORM OF CIVIL NUCLEAR LIABILITY: INTERNATIONAL SYMPOSIUM 59, 78–79 (1999), https://www.oecd-nea.org/law/legislation/nea2188-liability.pdf ("Therefore, the determination of the reasonableness of the measures shall, to a great extent, depend on the social and health priorities of the Contracting Party whose court shall have jurisdiction according to the provisions of the Protocol.").

21 This is because the Conventions allow victims to introduce "where reasonable, the equivalent of [damaged environmental] components into the environment." Paris Convention Amendments of 2004, *supra* note 4, at 16, art. 1(viii); Vienna Convention Consolidated Text, *supra* note 6, at 128, art. I(1)(m); Convention on Supplementary Compensation, *supra* note 7, art. I(g).

site where the presence of [the pollutant] would not pose the same hazard to ultimate success."[22] Once again, though, this will vary across jurisdictions.

Despite this variance as to the exact nature of the appropriate remedy, the concept that pure environmental harm can generally constitute "nuclear damage" is now established in the conventions dealing with nuclear liability. But when *cross-border* environmental damage occurs, the inquiry becomes more complicated.

B. *Cross-Border Environmental Damage under the Nuclear Liability Conventions*

Whether cross-border environmental damage is covered by the nuclear liability conventions depends, in part, on the relationship between the victim state and the installation state.[23] As a preliminary matter, the Conventions' nuclear damage definition does not distinguish between nuclear damage suffered in the installation state and nuclear damage suffered in neighboring states.[24] So either the broad nuclear damage definition—which includes environmental harm—applies *in toto* to neighboring countries, or it does not apply at all. Under the conventions, the simplest way for a neighboring state to ensure that cross-border nuclear damage is covered is for both states to be signatories to a Convention.[25] Otherwise, the extent to which cross-border nuclear damage is recoverable under the Convention becomes nuanced, and there are slight variations depending on which liability convention applies.

Article 2 of the amended Paris Convention, for instance,

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22 *Puerto Rico*, 628 F.2d at 675.

23 Throughout this Article, "victim state" will refer to any neighboring states that suffer from environmental harm following a nuclear accident. "Installation state" (or "source state") will refer to the state that licensed and authorized the nuclear power plant's operation.

24 Paris Convention Amendments of 2004, *supra* note 4, at 16, art. 1(vii); Vienna Convention Consolidated Text, *supra* note 6, at 128, art. I(1)(k); Convention on Supplementary Compensation, *supra* note 7, art. I(f).

25 Even without a relationship through a Convention, neighboring victims can still seek judicial recourse either in their own country, or in the installation state, using the normal legal channels in both states. But without treaty relations, there is no guarantee that: 1) only one country's courts will judge claims; 2) the applicable tort law will recognize pure environmental damage as a recoverable form of damage; or 3) any resulting judgment will be enforceable.

stipulates that its broad nuclear damage definition applies to any damage suffered in the territories of:

- A Contracting Party;[26]
- A non-Contracting State that has no nuclear installations in its territory;
- A non-Contracting State that has in force nuclear liability legislation that affords reciprocal benefits to those identified in the Paris Convention itself; and
- A non-Contracting State that is a Contracting Party to the Vienna Convention and to the Joint Protocol.[27]

Although worded and structured differently, the Vienna Convention (Article 1 A) offers largely similar results.[28] Under both regimes, if no relationship through a Convention exists between the victim state and installation state, then the inquiry turns on factors that serve to ensure that no states become free-riders vis-à-vis the nuclear liability regime.[29] Essentially, if the

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26 A "contracting party" is a state that has consented to be bound by a treaty or convention that may not be in force, such as the Paris Convention Amendments of 2004. *See* Vienna Convention on the Law of Treaties art. 2, May 23, 1969, 1155 U.N.T.S. 331 (providing a general definition of the term "Contracting State").

27 Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention on Third Party Liability in the Field of Nuclear Energy, Sept. 21, 1988, 1672 U.N.T.S. 293 [hereinafter "Joint Protocol"]. The Joint Protocol was adopted in 1988, and it serves as a "bridge" between the Paris liability regime and the Vienna liability regime by extending the benefits of one convention to the victims in the territories of the other convention. The relevancy of Joint Protocol is perhaps now lessened, because the revised Paris and Vienna Conventions both stipulate that they apply to nuclear damage suffered in any non-contracting state that offers reciprocal benefits—any nuclear state that ratifies the Paris or Vienna Convention will likely be offering reciprocal benefits to the installation state.

28 The Vienna Convention broadly stipulates, "This Convention shall apply to nuclear damage wherever suffered." Vienna Convention Consolidated Text, *supra* note 6, at 129, art. I A. Yet Article I A further provides that the legislation of the installation state may exclude application of the Convention to damage suffered in a non-contracting state if that state has a nuclear installation and does not afford reciprocal benefits. *Id.*

29 As for the Brussels Supplementary Convention, *supra* note 5, and Convention on Supplementary Compensation, *supra* note 7, those are both *supplementary* conventions, and so whether they cover cross-border environmental damage will largely depend on the other conventions. Brussels Supplementary Convention Consolidated Text, *supra* note 5, art. 1; Convention on Supplementary Compensation, *supra* note 7, art. II. Yet an important distinction exists between the extra-territorial reach of the Paris Convention, *supra* note 4, and the Brussels Supplementary Convention.

victim state has nuclear installations—and lacks reciprocal nuclear liability legislation—then the installation state will not have any *conventional* international-law obligations to pay for cross-border environmental damage.

Notably, neither the Paris Convention nor the Vienna Convention purports to *prohibit* compensating "free-riding" states; they merely provide contracting states with an option to forego implementing liability legislation that would compensate nuclear damage in those states. Whether this is a false choice under international law depends on whether general international legal principles would still require compensation anyway (see Part II below).

C. *Operator Liability under the Nuclear Liability Conventions*

The Paris and Vienna Conventions are *private* liability regimes in the sense that they channel *all* legal liability to the nuclear operator[30]—states bear no *public* liability if a private nuclear operator within their territory has an accident with cross-border implications.[31] "Legal channeling" ensures that victims

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Although the Paris Convention applies to certain non-contracting states, the Brussels Supplementary Convention—because it contemplates using public funds—applies only to other states that have acceded to the Brussels Supplementary Convention. Brussels Supplementary Convention Consolidated Text, *supra* note 5, art. 2. The Convention on Supplementary Compensation, by contrast, applies to states that have acceded to the Paris Convention or the Vienna Conventions, or have implemented national legislation that comply with the principles set forth in its annex. Convention on Supplementary Compensation, *supra* note 7, art. II(2).

30 Paris Convention Amendments of 2004, *supra* note 4, at 17, art. 3; Vienna Convention Consolidated Text, *supra* note 6, at 130, art. II. Although the Brussels Supplementary Convention, *supra* note 5, and Convention on Supplementary Compensation, *supra* note 7, contemplate "supplemental" state funding as a *treaty obligation* in the event of a nuclear accident, neither purport to establish any installation state *liability*. The precise funding mechanisms of the two supplementary conventions are discussed below.

31 Of course if the nuclear operator were government-owned, then the state (as the nuclear operator) would be responsible for providing compensation. *See* PATRICIA BIRNIE, ALAN BOYLE & CATHERINE REDGWELL, INTERNATIONAL LAW AND THE ENVIRONMENT 526 (Oxford Univ. Press 3d ed. 2009) ("The civil liability conventions ensure that states or their organs are precluded from invoking jurisdictional immunities, except in relation to the execution of judgments . . . apart from this exception, states sued under the Conventions in their own courts will be subject to the same liability, and enjoy the same defences, as other categories of defendants."). For purposes of this Article, I assume that the nuclear operator is privately owned, to avoid this potential wrinkle. In any event, the liability limitations

have an easy judicial target because they do not need to identify whether a particular vendor or supplier is at fault.[32] These two Conventions further channel all claims to a court in the state where the accident occurred.[33] Legal and jurisdictional channeling allows all injured parties (regardless of nationality) quick access to the courtroom and compensation.[34] By channeling all liability to the operator—and by authorizing courts in the installation state to hear all claims—victims in neighboring states who suffer environmental damage have easy recourse to compensation. This recourse is further aided by the Conventions' requirement to impose "strict liability" upon the operator; with strict liability, claimants do not need to establish that the operator negligently or intentionally breached a duty of care to the claimant, but rather need to show only causation and damages before receiving compensation. Given nuclear power's technical and complex nature, the convention drafters believed imposing strict liability was necessary to ease litigation burdens for prospective plaintiffs.[35]

Yet legal channeling, jurisdictional channeling, and strict liability come at a cost. Both the Vienna and Paris Conventions require states to impose at least some liability on operators, in an amount no less than a specified minimum.[36] So long as this minimum amount is met, states may then cap operator liability. The Vienna Convention, for instance, provides that operators (or

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embedded in the Conventions—and implementing national legislation—would still govern the *extent* of the state's liability as a nuclear operator. And, as discussed below in Part II, these limitations on installation state liability in this context are probably not justifiable in light of international law principles. In this regard, therefore, any cleavages between the nuclear liability conventions and general public international law would still exist even when the operator is state-owned.

32 Schwartz, *supra* note 2, at 310–11.

33 Paris Convention Amendments of 2004, *supra* note 4, at 21–22, art. 13; Vienna Convention Consolidated Text, *supra* note 6, at 136, art. XI. Any cases involving multiple jurisdictions are to be dealt with by agreement of the parties under the Vienna Convention or by a tribunal under the Paris Convention. Paris Convention Amendments of 2004, *supra* note 4, at 21–22, art. 13; Vienna Convention Consolidated Text, *supra* note 6, at 136, art. XI.

34 Schwartz, *supra* note 2 at 308–310.

35 *See* IAEA, *supra* note 2, at 1 (explaining that strict liability should be applied to nuclear damage because it can be difficult for claimants to establish actual negligence); *see also* BIRNIE ET AL., *supra* note 31, at 524.

36 Paris Convention Amendments of 2004, *supra* note 4, at 18, art. 7; Vienna Convention Consolidated Text, *supra* note 6, at 132, art. V.

the installation state[37]) must be liable for at least 300 million SDRs.[38] The amended Paris Convention sets minimum operator liability at 700 million euros.[39] These minimums are both unrealistically low if a severe nuclear accident causes cross-border effects. So far, for instance, the Fukushima accident has required Tepco to pay out more than 5.7 trillion yen in compensation (about 44 billion USD).[40] Fortunately, Fukushima did not cause any significant cross-border damage and prevailing winds steered most radioactive fallout out to sea rather than over densely populated areas.[41] That 44 billion USD number could therefore be much higher if a severe nuclear accident were to affect multiple countries. As Fukushima shows, any severe accident will quickly dwarf the liability minimums embedded in the two primary nuclear liability conventions.[42]

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37 Article V of the Vienna Convention Consolidated Text, *supra* note 6, at 132, stipulates that operator liability can be limited to just 150 million SDRs, but then the installation state would need to make available additional funds that total 300 million SDRs. If operator liability is set at 300 million SDRs or higher, then no additional state funding is necessary. Like the Brussels Supplementary Convention Consolidated Text, *supra* note 5, art. 3, and Convention on Supplementary Compensation, *supra* note 7, art. III, any state-funding role under the Vienna Convention would be borne from treaty obligation, rather than from a judicial determination that the installation state is liable under international law for cross-border environmental damage.

38 The SDR ("special drawing right") "is an international reserve asset, created by the IMF in 1969 to supplement its member countries' official reserves." *Special Drawing Right SDR*, INT'L MONETARY FUND (Sept. 30, 2016), http://www.imf.org/en/About/Factsheets/Sheets/2016/08/01/14/51/Special-Drawing-Right-SDR. As of September 15, 2016, 1 SDR was equivalent to 1.40 USD. *SDR Valuation*, INT'L MONETARY FUND, https://www.imf.org/external/np/fin/data/rms_sdrv.aspx (last visited Sept. 15, 2016).

39 Paris Convention Amendments of 2004, *supra* note 4, at 18, art. 7.

40 *See* 賠償金のお支払い状況 [*Records of Applications and Payouts for Indemnification of Nuclear Damage*], TOKYO ELEC. POWER CO., http://www.tepco.co.jp/fukushima_hq/compensation/results/index-j.html (last visited Apr. 21, 2016).

41 *See* Declan Butler, *Prevailing Winds Protected Most Residents from Fukushima Fallout*, NATURE MAG., Feb. 28, 2013, http://www.scientificamerican.com/article/prevailing-winds-protectected-most-residents-from-fukushima-fallout/.

42 With respect to the Chernobyl accident, the Soviet Union's breakup (and lack of a formal compensation system) hindered a precise calculation of the amount of damage. But the IAEA recently speculated that the number could easily total "*hundreds* of billions of dollars." Press Release, IAEA, Chernobyl: The True Scale of the Accident (Sept. 5, 2005), https://www.iaea.org/PrinterFriendly/NewsCenter/PressReleases/2005/prn20

And even if the Conventions removed these minimums and required unlimited liability, there would still be an inherent tension between channeling all liability to an operator while—at the same time—imposing unlimited liability.[43] An operator's ability to pay is limited by both insurance availability and the operator's assets. Neither is sufficient to provide effective compensation after a significant accident. Insurance companies cannot provide financial security for a single accident costing over 50 billion USD.[44] And Tepco's experience in Japan shows that even large nuclear operators lack the resources to provide adequate compensation on their own. After Fukushima, Tepco's inability to fully compensate victims forced the Japanese government to nationalize Tepco through a 1 trillion yen bailout plan *and* set aside 2.4 trillion yen (about 20 billion USD) for compensation payments arising from the accident.[45] This provides real-world evidence that large corporations could easily crumble following a severe nuclear accident.[46]

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43 Notably, Japan is one of the few countries that actually impose unlimited liability on a nuclear operator. *See* Ximena Vasquez-Maignan, *The Japanese Nuclear Liability Regime in the Context of the International Nuclear Liability Principles*, *in* JAPAN'S COMPENSATION SYSTEM FOR NUCLEAR DAMAGE 9, 10 (2012), https://www.oecd-nea.org/law/fukushima/7089-fukushima-compensation-system-pp.pdf. Yet Japanese law recognizes the tension between channeling all liability to an operator while requiring unlimited liability—Section 16 of Japan's Compensation Act contemplates the Japanese government providing financial assistance to the operator if the liability amounts exceed the operator's financial security amount. *Id.* at 12. This happened following the Fukushima accident.

44 *See* Mark Tetley, *Revised Paris and Vienna Nuclear Liability Conventions: Challenges for Nuclear Insurers*, NUCLEAR LAW BULLETIN, Aug. 17, 2006, at 27, 34, http://dx.doi.org/10.1787/nuclear_law-2006-5k9czfxg73hk (explaining that it is "the intention of insurers to provide the new, higher amounts of EUR 700 million/SDR 300 million, *although this will be challenge as the new amount exceeds the maximum available capacity currently available*" (emphasis added)). Tetley's article further emphasizes that "almost all forms of environmental liability are currently uninsurable." *Id.* at 36. This provides another reason why private insurance cannot solve the cross-border environmental damage problem.

45 Hiroko Tabuchi, *Japan to Nationalize Fukushima Utility*, N.Y. TIMES (May 9, 2012), http://www.nytimes.com/2012/05/10/business/global/japan-to-nationalize-fukushima-utility.html?_r=0.

46 A further financial strain on the nuclear operator would be that the accident would be wiping out a valuable asset—*i.e.*, the actual nuclear power plant. After the Fukushima accident, Tepco also incurred large fuel costs as it made up for capacity lost at the Fukushima Daiichi plant. *See id.*

Yet Japan's experience shows that if a severe accident causes over 50 billion USD of damage *in one state*, then the operator's inability to make all victims whole is tempered by the installation state's strong incentive to rectify any funding deficiencies. This principle is expressly codified in the United States, where the Price-Anderson nuclear liability law contemplates Congress providing additional funds if an accident exceeds insurance limits.[47] Japan has a similar law bringing state resources to bear when adequate private compensation is impossible.[48] But a question remains whether states would be as generous with the public purse when compensating both their own citizens and citizens from neighboring states. If an accident causes 50 billion USD in the installation state and 25 billion USD in neighboring states, it is possible—if not probable—that the installation state would prioritize compensating its own victims at the expense of ensuring that neighboring victims also receive full compensation.[49] This would create disharmony between the Conventions' non-discrimination principle and the reality that a single nuclear

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47 Price-Anderson Nuclear Industries Indemnity Act, 42 U.S.C. §§ 2210(e) ("[I]n the event of a nuclear incident involving damages in excess of the amount of aggregate liability, the Congress will thoroughly review the particular incident and will take whatever action is determined necessary and appropriate to protect the public from the consequences of a disaster of such magnitude."), 2210(i) (requiring the President to submit a compensation plan to Congress after any nuclear incident involving damages that are likely to exceed the applicable amount of aggregate public liability; such a compensation plan "shall provide for full and prompt compensation for all valid claims and contain a recommendation or recommendations as to the relief to be provided, including any recommendations that funds be allocated or set aside for the payment of claims that may arise as a result of latent injuries that may not be discovered until a later date").

48 Section 16 of Japan's Compensation Act provides that the Japanese government should provide aid to the operator to assist with compensation. This assistance is entirely discretionary, however, as it requires approval from Japan's National Diet. Toyohiro Nomura, Taro Hokugo & Chihiro Takenaka, *Japan's Nuclear Liability System*, *in* JAPAN'S COMPENSATION SYSTEM FOR NUCLEAR DAMAGE, *supra* note 43, at 15, 17. I question whether Japan's Diet (or America's Congress) would grant such an approval if the "victim" was primarily another state's environment.

49 For example, though the Chernobyl accident caused extensive cross-border damage, the Soviet Union did not offer significant compensation to other victim states. *See infra* Part II.A. It did, however, make some concessions like entering into a favorable trade agreement with one victim state. Gunther Handl, *Transboundary Nuclear Accidents: The Post-Chernobyl Multilateral Legislative Agenda*, 15 ECOLOGY L.Q. 203, 224 (1988).

operator cannot provide adequate compensation on a global scale.[50]

The Brussels Supplementary Convention and the Convention on Supplementary Compensation seek to address any shortfalls that result from relying exclusively on the operator by providing supplemental state funding if needed.[51] The Brussels Convention operates by creating funding "tiers." The first funding tier comes from financial security held by the operator, which under the Paris Convention cannot be lower than 700 million euros; the second tier comes from the installation state, which must provide an additional 500 million euros; the third tier comes from pooled funds from the other contracting parties, in the amount of 300 million euros.[52] The Convention on Supplementary Compensation, by contrast, operates on a two-tiered system.[53] The first compensation tier is 300 million SDRs (the minimum amount under the revised Vienna Convention), which—like the Vienna Convention—must be provided by either the operator, the installation state, or a combination of the two.[54] The second tier is an international fund—used when damage amounts exceeds the first tier.[55] This fund is calculated per the formula in Article IV; in the unlikely event that *all* nuclear states joined this Convention, it would be around 350 million SDRs.[56] The ultimate result is that these two

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50 The Conventions all stipulate that they shall be applied without discrimination based upon nationality, domicile, or residence. Paris Convention Consolidated Text, *supra* note 4, at art. 14; Vienna Convention Consolidated Text, *supra* note 6, at 137, art. XIII; Convention on Supplementary Compensation, *supra* note 7, at art. III(2)(a). Yet it is difficult to see how a single entity—even if that entity is a large nuclear operator—can provide sufficient compensation for a significant nuclear accident affecting multiple countries.

51 Brussels Supplementary Compensation Amendments of 2004, *supra* note 5, at 14, art. 3; Convention on Supplementary Compensation, *supra* note 7, at ch. II.

52 *See 2004 Protocol to Amend the Brussels Supplementary Convention on Nuclear Third Party Liability*, INT'L ATOMIC ENERGY AGENCY, https://www.oecd-nea.org/law/brussels-supplementary-convention-protocol.html (last visited Sept. 15, 2016).

53 Convention on Supplementary Compensation, *supra* note 7, at ch. II.

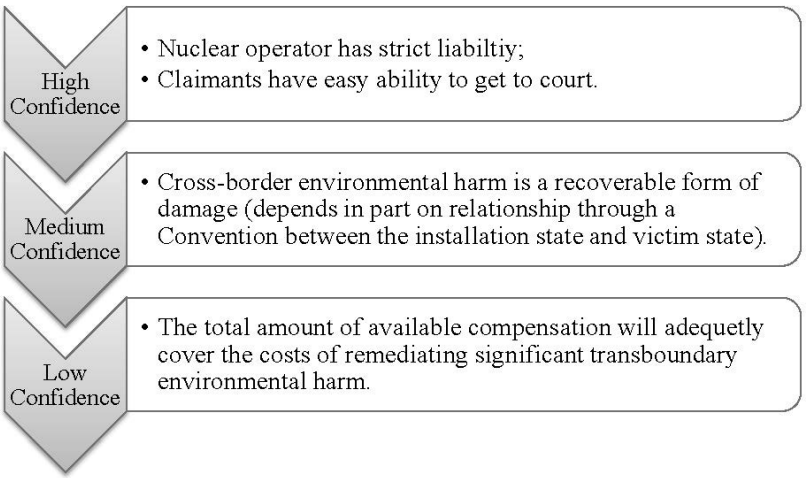
54 *Id.*

55 *Id.* at ch. III. Under Article XI of this Convention, 50% of this pooled fund must be spent compensating extra-territorial damage.

56 Norbert Pelzer, *Main Features of the Revised International Regime Governing Nuclear Liability – Progress and Standstill, in* INTERNATIONAL NUCLEAR LAW: HISTORY, EVOLUTION, AND OUTLOOK, *supra* note 2, at 355, 381. As Pezler points out, it is improbable that all nuclear states will join this

conventions provide some additional funding after a severe nuclear accident. But not much. An extra 800 million euros (Brussels Supplementary Convention), or 350 million SDRs (Convention on Supplementary Compensation) is not going to make any meaningful difference in plugging the funding gaps left by the operator if an accident creates 50 billion USD worth of damage.

Ultimately, the nuclear liability conventions provide clarity when it comes to jurisdictional issues, as well as liability rules. This clarity, however, masks fundamental cracks in the underlying edifice of these conventions—namely, that there will not be enough money to compensate cross-border victims after a truly devastating accident. This is illustrated below, as the clarity regarding liability and jurisdiction descends into increasingly less confident assertions about an operator's ability to provide adequate funding:



D. *The France-Germany Hypothetical under the Paris Convention*

We now have a sense how the France-Germany hypothetical from the Introduction would play out under the liability conventions.[57] Following the nuclear accident, France establishes a

convention, and so (in reality) this number will be lower.

57 France and Germany are parties to both the Paris Convention and the Brussels Supplementary Convention. Paris Convention Consolidated Text, *supra* note 4; Brussels Supplementary Convention Consolidated Text, *supra* note 5.

special claims tribunal in France to handle all claims from victims suffering nuclear damage. Germany—taking advantage of Article 13(g)(i) of the Paris Convention—submits a unified claim for damage that encompasses all the nuclear damage suffered in the Black Forest.[58] Germany's claim, therefore, includes:

- Medical costs for addressing radiation poisoning;[59]
- damage to individual property;[60] and
- the economic loss suffered by the timber[61] and tourism industries.[62]

It also includes significant environmental claims:

- the costs of restoring rivers, lakes, bird reserves, nature reserves, and forest reserves; and
- the cost of remediating radiation damage to the newly created Black Forest National Park.[63]

We will suppose Germany's claim, in total, costs 100 billion euros, much of which reflects the cost of reinstating the Black Forest's environment.

Suppose French claims are also in the range of 100 billion euros. All claims are funneled into the same tribunal in France, which quickly determines that the French operator is strictly liable for all this damage.[64] But France can cap the operator's liability, so long as it requires the minimum 700 million euros financial security pursuant to the Paris Convention.[65] Assume French law

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58 Article 13(g)(i) of the Paris Convention Amendments of 2004, *supra* note 4, at 21, provides, "any State may bring an action on behalf of persons who have suffered nuclear damage, who are nationals of that State or have their domicile or residence in its territory, and who have consented thereto."

59 *Id.* at 16, art. 1(a)(vii)(1).

60 *Id.* at 16, art. 1(a)(vii)(2).

61 *Id.* at 16, art. 1(a)(vii)(3).

62 *Id.* at 16, art. 1(a)(vii)(5).

63 *Id.* at 16, art. 1(a)(vii)(4).

64 *Id.* at 17, art. 3. Because both France and Germany are signatories to the Paris Convention, France would have to apply the Paris Convention's strict liability rule for both domestic and international damage. The Paris Convention does not distinguish between damage in the installation state and damage in neighboring states, and so France must implement national legislation that imposes strict operator liability—regardless of whether the damage occurs in France, Germany, or both states. *Id.* at 16, art. 1(a)(vii). In this regard, the French tribunal would be applying the Paris Convention for all claims for damage.

65 *Id.* at 18, art. 7(a).

limits the operator's liability to 2 billion euros.[66] The Brussels Supplementary Convention then kicks in, and France provides an additional 500 million euros to the compensation pool, while the other contracting parties (including Germany) contribute 300 million euros in total. These supplementary 800 million euros are quickly exhausted, and the operator's remaining liability is capped at 2 billion euros; and even if French law did not cap its liability, the operator's assets cover only a fraction of the remaining claims. After a public outcry, the French government steps in and takes responsibility for providing compensation to all remaining French victims. Germany's claim, however, is left to flounder, and eventually Germany pays for the clean-up of the Black Forest itself.[67] This hypothetical reveals the limitations inherent in the nuclear liability conventions.

When compensating nuclear damage on a small or moderate scale—like the damage that resulted from the Three Mile Island Accident[68]—the existing liability conventions do a good job of

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66 This is a fictional limit. As of June 2014, French law limited operator liability to a paltry 91.5 million euros. *See Nuclear Operator Liability Amounts and Financial Security Limits*, NUCLEAR ENERGY AGENCY (June 2014), http://www.oecd-nea.org/law/2014-table-liability-coverage-limits.pdf. Of course once the 2004 protocol to the Paris Convention enters into force, this will need to rise to *at least* 700 million euros. Paris Convention Amendments of 2004, *supra* note 4, at 18, art. 7.

67 The Paris Convention provides that "the nature, form, and extent of compensation within the limits of this Convention, as well as the equitable distribution thereof, shall be governed by national law." Paris Convention Consolidated Text, *supra* note 4, at art. 11. The Vienna Convention contains the same provision, but then adds that in the event claims exceed the maximum amount of liability, then "priority in the distribution of compensation shall be given to claims in respect of loss of life or personal injury." Vienna Convention Consolidated Text, *supra* note 6, at 135, art. VIII. Presumably, therefore, the French court charged with handling the nuclear claims would prioritize claims for personal injury (French or German) at the expense of Germany's environmental-damage claim.

68 The small radioactive release following the Three Mile Island accident had no detectable health effects on plant workers or the public. *See Backgrounder on the Three Mile Island Accident*, U.S. NUCLEAR REGULATORY COMM'N 2 (Feb. 2013), http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.pdf. This, accordingly, limited compensation claims to primarily "economic" type claims for lost wages, forced evacuation costs, loss of property values, etc. The total amount of compensation paid for these claims was 71 million USD. *See Nuclear Insurance and Disaster Relief*, U.S. NUCLEAR REGULATORY COMM'N 2 (June 2014), http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/nuclear-insurance.pdf. The cleanup of the damaged reactor itself cost approximately 973 million USD. *See Three Mile Island Accident*, WORLD

ensuring effective and efficient compensation. Legal channeling means victims do not have to identify which component in the nuclear installation caused the injury, strict liability means victims do not need to establish fault or negligence, and unity-of-jurisdiction provides cross-border victims easy access to court.[69] But when compensating nuclear damage on a significant scale—like the damage resulting from the Fukushima accident—the nuclear liability conventions begin to stretch past their breaking point. Legal channeling and strict liability are futile benefits if the operator's insurance and assets pale in comparison to its liability. The Paris and Vienna Conventions' primary weakness is their focus on the operator's responsibility to provide compensation. The Brussels Supplementary Compensation and Convention on Supplementary Compensation try to address this flaw, but do so in an insignificant way; neither 800 million euros nor 350 million SDRs are high enough sums. This weakness is less important in the national context because of the strong incentives states have to ensure effective compensation for their own citizens and environment. But the liability conventions could completely unravel when addressing an accident with significant domestic *and* cross-border implications.

To return once more to the above hypothetical, assume that Germany—aware of the Paris Convention's ultimate futility when it comes to remediating its harm—forgoes submitting its claim to the French tribunal under the auspices of the Paris Convention. Instead, Germany submits a government-to-government claim against France in the International Court of Justice, relying on this provision from the Paris Convention: "this Convention shall not affect the rights and obligations of a Contracting Party under the general rules of public international law."[70] Germany therefore bases its right for compensation not on the Paris Convention, but rather on general principles of public international law. Would Germany succeed?

NUCLEAR ASS'N (Jan. 2012), http://world-nuclear.org/information-library/safety-and-security/safety-of-plants/three-mile-island-accident.aspx.

69 *See* Julia A. Schwartz, *Liability and Compensation for Third Party Damage Resulting from a Nuclear Incident*, *in* INTERNATIONAL NUCLEAR LAW: HISTORY, EVOLUTION, AND OUTLOOK, *supra* note 2, at 307, 309–13.

70 Paris Convention Amendments of 2004, *supra* note 4, at art. 16bis. All nuclear liability conventions contain this provision. Vienna Convention Consolidated Text, *supra* note 6, at 138, art. XVIII; Convention on Supplementary Compensation, *supra* note 7, at art. XV.

II. STATE LIABILITY UNDER PUBLIC INTERNATIONAL LAW

If the nuclear liability conventions provide predictability and easy access to justice coupled with a limited compensation amounts, then public international law provides the opposite—unpredictability along with barriers to justice, but potentially higher compensation amounts. This Article assumes that any international adjudication would take place before the International Court of Justice (ICJ),[71] and that the ICJ has jurisdiction to hear the case.[72]

As noted above, all liability conventions contain the following provision: "this Convention shall not affect the rights and obligations of a Contracting Party under the general rules of public international law." This provision addresses and rebuts any potential argument that state responsibility extends only as far as the actual nuclear convention treaty text. Even if a state fully complies with the Paris or Vienna Convention, it does not necessarily follow that the state has then also *fully* discharged its international law responsibilities.[73] The distinction between the

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71 This is just one potential forum. The affected states could establish a special tribunal to hear the claims. Unless specifically ordered to apply national law, any special tribunal would have to determine liability and compensation in accordance with the same rules of public international law that the ICJ would be following, and so the outcome should not be entirely forum-dependent. Only states can bring claims before the International Court of Justice. Statute of the International Court of Justice art. 34, ¶ 1, June 26, 1945, 8 U.N.T.S. 993. The same would be true of a claim before any other special tribunal. Already this provides a contrast with the liability conventions, which allow for citizen suits as well.

72 ICJ has the competence to hear "all cases which the parties refer to it." *Id.* at art. 36, ¶ 1. States also recognize jurisdiction "as compulsory ipso facto and without special agreement, in relation to . . . all legal disputes concerning . . . any question of international law." *Id.* at art. 36, ¶ 2. This Article assumes one of these two provisions provides the jurisdictional basis for any claim, though in an actual case, the jurisdictional question would likely be heavily litigated. *See, e.g.*, Nuclear Tests (Austl. v. Fr.), 1974 I.C.J. 253 (Dec. 20) (concluding that the ICJ did not have jurisdiction to hear Australia's claim that French atmospheric nuclear testing violated international law).

73 Complying with the terms of the applicable liability convention only partially satisfies an installation state's international legal obligations vis-à-vis nuclear liability. As recognized by the Conventions, the full panoply of an installation state's international legal obligations sweeps much broader than just the terms of Conventions. *See* Handl, *supra* note 49, at 241 (noting that "no legal or technical obstacles currently exist . . . to the assertion of an extraconventional international strict liability claim for compensation of accidental transboundary nuclear harm").

existing liability conventions and the "general rules of public international law" is starkest when nuclear accidents inflict cross-border harm. Such an accident would undoubtedly lead to claims for compensation under the liability conventions. But if that compensation proved to be inadequate (or if no treaty relationship existed between the affected states), then cross-border victims would still be free to seek compensation *from the installation state itself* to plug any funding gaps. In so doing, states would be leaving the highly prescribed liability conventions and entering the murkier waters of public international law.

A. *The "General Rules of Public International Law"*

So what, exactly, are the "general rules of public international law" that govern cross-border environmental harm resulting from a nuclear accident? To date, neither the ICJ nor any other international tribunal has *directly* addressed this question. For a variety of reasons, victim states brought no formal claims against the Soviet Union after Chernobyl.[74] The consensus is that political expediency and concerns about enforcing any judgment—rather than a hard look at international environmental law—contributed to the lack of Chernobyl claims.[75] The Fukushima incident, for its part, did not cause significant cross-border environmental damage.[76] Without a direct case on point addressing the general

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74 *See id.* at 223 (noting that some European governments were more concerned with securing Soviet cooperation for long-term management rather than obtaining compensation). Professor Handl further notes that the Soviet Union agreed to a trade deal with one victim state immediately following the accident, which he believes constituted an informal means of compensation. *Id.* at 224. Other commentators believe that the uncertain state of the law may have contributed to the lack of claims, but political considerations were still paramount. *See* BIRNIE ET AL., *supra* note 31, at 518 ("Uncertainty over the basis for such a claim, reluctance to establish a precedent with possible future implications for states which themselves operate nuclear power plants, and the absence of any appropriate treaty binding on the Soviet Union are the main reasons for this silence."). Finally, another commenter speculated that the Soviet Union's likely refusal to actually consider itself bound by any judgment affixing compensation also played a role in the lack of formal state-to-state claims. Linda Malone, *The Chernobyl Accident: A Case Study in International Law Regulating State Responsibility for Transboundary Nuclear Pollution*, 12 COLUM. J. ENVTL. L. 203, 237–238 (1987).

75 *See* sources cited *supra* note 74.

76 So far, neighboring states have not brought any claims for cross-border damage against Japan. This is due to Fukushima's coastal location and prevailing wind patterns, which substantially diluted most of the

rules of international law as it relates to nuclear accidents, Article 38(1) of the ICJ Statute becomes instructive. That Article identifies three independent "sources" of public international law:

a. international conventions [i.e., formal agreements], whether general or particular, establishing rules expressly recognized by the contesting states;
b. international custom, as evidence of a general practice accepted as law; [and]
c. the general principles of law recognized by civilized nations . . . .[77]

Here, no formal international convention exists—and the ones that are the closest fit explicitly disclaim any intention to govern *state* liability.[78] So we are left with either international customary law or the "general principles of law recognized by civilized nations."[79] Although ICJ opinions have, at times, blended and treated these two sources together, Judge Cançado Trindade's separate opinion in the *Pulp Mills* case clarifies that these are best viewed as two autonomous sources of public international law: "a general principle of law is quite distinct from a rule of customary international law . . . ."[80]

International customary law consists of customs and rules that legally bind states, even without a commitment in a convention.[81] Customary law contains two elements: 1) state practice, and 2) *opinio juris*, which denotes a subjective obligation to be bound by

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atmospheric contamination as it traveled across the Sea of Japan and Pacific Ocean. This meant that "radiation levels in eastern China, Korea and the western United States, while detectable, were said by most experts to present no serious threat to crops, livestock or people." Stephen Kass, *International Law Lessons from the Fukushima Disaster*, CARTER LEDYARD & MILBURN LLP (Apr. 29, 2011), http://www.clm.com/publication.cfm?ID=324.

77 Statute of the International Court of Justice, *supra* note 71, art. 38 ¶ 1. A fourth "source" mentioned in Article 38—"iudicial decisions and the teachings of the most highly qualified publicists of the various nations"—is not relevant here because this source does not exist independent of the other three sources. That is, any judicial decision is going to have to base its decision off of either a treaty, custom, or general principle.

78 *See supra* note 70.

79 Statute of the International Court of Justice, *supra* note 71, at art. 38(1).

80 Pulp Mills on the River Uruguay (Arg. v. Uru.), 2010 I.C.J. 18, 142 (Apr. 20) (separate opinion by Cançado Trindade, J.) (translated by author). Judge Cançado Trindade also emphasizes that both of these sources of public international law are distinct from the norms derived from treaties. *See id.*

81 Continental Shelf (Libya/Malta), 1985 I.C.J. 13, 29 (June 3).

the practice in question.[82] The *opinio juris* element is the more difficult of the two to establish. As explained by the ICJ:

> Not only must the acts concerned amount to a settled practice, but they must also be such, or be carried out in such a way, as to be evidence of a belief that this practice is rendered obligatory by the existence of a rule of law requiring it. The need for such a belief, i.e., the existence of a subjective element, is implicit in the very notion of the *opinio juris sive necessitatis.* The States concerned must therefore feel that they are conforming to what amounts to a legal obligation. The frequency, or even habitual character of the acts is not in itself enough. There are many international acts, e.g., in the field of ceremony and protocol, which are performed almost invariably, but which are motivated only by considerations of courtesy, convenience or tradition, and not by any sense of legal duty.[83]

Customary law can become "codified" through a formal convention (an example being the customary law surrounding warfare).[84] And, likewise, a customary rule can also overlap with—and influence—the "general principles of international law recognized by civilized nations."[85]

Yet those "general principles" *do* form their own unique source of public international law.[86] Judge Cançado Trindade's separate opinion explains this source's origins, and he argues that it includes two separate strands: 1) general principles that are recognized *in foro domestico* (i.e., those legal principles that are in force across all domestic legal systems), and 2) stand-alone international legal principles.[87] Judge Cançado Trindade's innovation is recognizing and emphasizing the latter strand:

> In contemporary international law, general principles of law

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82 *Id.*

83 North Sea Continental Shelf (Ger./Den.; Ger./Neth.), 1969 I.C.J. 3, 44 (Feb. 20).

84 *See* Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, 1996 I.C.J. 226, 256 (July 8) [hereinafter *Nuclear Weapons*] (explaining that "laws and customs of war" were the subject of efforts at codification undertaken in The Hague, specifically through The Hague Conventions of 1899 and 1907).

85 Statute of the International Court of Justice, *supra* note 71, art. 38(1). For the interplay between customary international law and these "general principles of international law," see *infra* text accompanying footnote 88.

86 *Pulp Mills on the River Uruguay*, 2010 I.C.J. at 142–45 (separate opinion by Cançado Trindade, J.).

87 *Id.* at 135–38.

> find concrete expression not only *in foro domestico*, but also at [the] international level. . . . Always keeping their autonomy, they may find expression in other formal sources of manifestations of international law (and not only treaties and custom), even though not listed in Article 38(1)(c) of the ICJ statute, but nonetheless resorted to by the ICJ in practice.[88]

Essentially, Judge Cançado Trindade instructs public-international lawyers to search for these general principles everywhere—look at laws in force domestically, treaties, custom, United Nations General Assembly resolutions.[89] Once identified, these principles become "the basic pillars of the international legal system," guiding and directing both customary rules and conventional norms, although maintaining their autonomy.[90]

Judge Cançado Trindade's conception of these general principles is especially helpful within the international environmental law context, for two reasons. First, the distinction between "custom" and "principle" is not always clear-cut. If general principles are an *autonomous* source of public international law, then lawyers need not undertake the difficult task of ascertaining whether a principle has the requisite *opinio juris* to be a binding custom. Take, for instance, the polluter-pays principle. Even if there is not sufficient state practice and *opinio juris* to render this into a customary rule, it can *still* be binding on states if the international community recognizes it to be a general international-law principle. Recognizing that "general principles" are unique and autonomous provides essential flexibility when trying to uncover the legal significance of various United Nations

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88 *Id.* at 146 (translated by author). Although commentators have always referenced the "general principles of law" source in the ICJ statute, they have tended to focus on this as consisting of legal concepts common to all domestic legal systems. *See, e.g.*, Handl, *supra* note 49, at 239. Judge Cançado Trindade helpfully recognizes that this is only part of what this source of international law encompasses.

89 *Pulp Mills on the River Uruguay*, 2010 I.C.J. at 146 ("In contemporary international law, general principles of law find concrete expression not only *in foro domestico*, but also at international level. There can be no legal system without them. Always keeping their autonomy, they may find expression in other formal 'sources' or manifestations of international law (and not only treaties and custom), even though not listed in Article 38 (1) (c) of the ICJ Statute, 8 U.N.T.S. 993, but nonetheless resorted to by the ICJ in practice. It is the case, inter alia, of resolutions of international organizations, in particular of the United Nations General Assembly.") (translated by author).

90 *Id.* at 150–55, 159 (translated by author).

resolutions, treaty principles, judicial opinions, state practice, and other authorities in international law.[91] In the end, lawyers and jurists can better make sense of the unwieldy amalgamation of adjudications, official declarations, and legal commentaries by allowing these various international law sources to fit together as a whole.

Additionally, as Judge Cançado Trindade points out, a remarkable awakening and outpouring involving international environmental law principles has occurred over the past few decades.[92] This is not an area where one must search far and wide to discover governing principles. Rather, these principles—which stem from sources as varied as treaties to global environmental declarations to the International Law Commission's work—are now widely understood;[93] so any analysis of whether states can incur liability after a nuclear accident must grapple with these principles regardless of whether they are, in fact, binding customs.

With custom and principles providing the "general rules of public international law" left intact by the liability conventions, state liability for nuclear damage rests on three key questions. First, does state liability extend to the acts of private nuclear operators? Second, if liability does attach, then is that liability strict, or fault-based? And, finally, does state liability cover environmental harm *per se*?

B. *State Liability for the Acts of Private Nuclear Operators*

The first question involves whether states can even be held liable for the actions of private nuclear operators. Commentators—building off the International Law Commission's work—have noted a distinction between two broad types of acts that can give rise to state liability to other states.[94] First are "wrongful acts,"

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91 As one commentator aptly stated, "the customary international law of transboundary pollution . . . is based on a very small number of inconclusive adjudications and a mountain of official declarations and unofficial commentary seeking to make something out of them." Thomas W. Merrill, *Golden Rules for Transboundary Pollution*, 46 DUKE L.J. 931, 932–33 (1997).

92 Pulp Mills on the River Uruguay, 2010 I.C.J. at 156.

93 *See infra* Sections II(B)(2)–(3).

94 See, e.g., Alan E. Boyle, State Responsibility and International Liability for Injurious Consequences of Acts not Prohibited by International Law: A Necessary Distinction?, 39 INT'L & COMP. L.Q. 1 (1990).

which entail a state breaching primary obligations to other states.[95] These primary obligations come from the entire corpus of customary and conventional law.[96] An example is a state's obligation under international law not to use force against another state.[97] Or a state's obligation not to interrupt peaceful maritime commerce.[98] With such wrongful acts, international law requires the offending state to erase the act's consequences or provide monetary reparations.[99]

But authorizing a nuclear power plant does not constitute a "wrongful act" *per se*. Neither convention, custom, nor principle prohibit states from allowing nuclear power plants to operate in their territory. This is where the second type of acts that can give rise to state liability becomes relevant—*i.e.*, when an otherwise lawful activity causes harmful consequences to other states. International tribunals, the United Nations, and the International Law Commission have all explored this second type of state liability.

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95 *Id.* at 2.

96 *See* Int'l Law Comm'n, Draft Articles on Responsibility of States for Internationally Wrongful Acts, UN Doc. A/56/10, at 31 (2001), http://legal.un.org/ilc/texts/instruments/english/commentaries/9_6_2001.pdf ("These articles seek to formulate, by way of codification and progressive development, the basic rules of international law concerning the responsibility of States for their internationally wrongful acts. The emphasis is on the secondary rules of State responsibility: that is to say, the general conditions under international law for the State to be considered responsible for wrongful actions or omissions, and the legal consequences which flow therefrom. The articles do not attempt to define the content of the international obligations, the breach of which gives rise to responsibility. This is the function of the primary rules, whose codification would involve restating most of substantive customary and conventional international law.").

97 Military and Paramilitary Activities in and Against Nicaragua (Nicar. v. U.S.) 1986 I.C.J. 14 (June 27).

98 Id.

99 *See* Chorzow Factory Case, 1927 P.C.I.J. (ser. A) No. 9, at 21 (July 16) ("The essential principle contained in the actual notion of an illegal act . . . is that reparation must, so far as possible, wipe out all the consequences of the illegal act and re-establish the situation which would, in all probability, have existed if that act has not been committed."); *see also* Int'l Law Comm'n, *supra* note 96, at art. 31 ("The responsible State is under an obligation to make full reparation for the injury caused by the internationally wrongful act.").

1. *Judicial Precedent*

The basis for assessing *state* liability for the harmful consequences of otherwise lawful activities has antecedents in international-law cases that predate the International Court of Justice. The first international adjudication addressing cross-border harm is the *Trail Smelter* arbitration.[100] This arbitration arose from a dispute between Canada and the United States over noxious fumes that were being blown downwind from a private smelter in Canada to the United States (specifically Washington State).[101]

The tribunal rendered an initial decision in 1938, finding Canada liable for 78,000 USD because the smelter damaged property in Washington.[102] After taking further evidence, the tribunal issued a second decision in 1941 about whether the United States was entitled to prospective relief. In so doing, the tribunal pronounced: "under the principles of international law, as well as the law of the United States,[103] no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequences and the injury is established by clear and convincing evidence."[104] The tribunal therefore held that Canada "is responsible in international law for the conduct of the Trail Smelter."[105] This decision established a precedent that states can bear liability for private corporations' actions. This is so even if the underlying activity (operating a smelter, or operating a nuclear power plant) is permissible under international law. Eventually, the *Trail Smelter* holding became incorporated into ICJ jurisprudence.

In the *Corfu Channel* case, for instance, the ICJ acknowledged the following "well-recognized principle": "every States' obligation not to allow knowingly its territory to be used

100 Trail Smelter (U.S. v. Can.), 3 R.I.A.A. 1905 (1938 & 1941). *Trail Smelter* may not have been the first adjudication in absolute terms to address the issue of cross-border pollution (the decision itself cites to U.S. Supreme Court cases, as well as to disputes between various cantons in Switzerland), but it is the first prominent international case on this subject.

101 *Id.* at 1917.

102 *Id.* at 1933.

103 This arbitration was undertaken under the auspices of the Ottawa Convention, which provided that the tribunal should apply American law to the dispute. *Id.* at 1912.

104 *Id.* at 1965.

105 *Id.*

for acts contrary to the rights of other States."[106] *Corfu Channel* involved damage to British naval ships resulting from a minefield in Albanian territorial waters in the Corfu Channel.[107] Although it was unclear who actually laid the mines,[108] the ICJ found sufficient evidence that Albania *knew* about the minefields.[109] The court held that this knowledge created an international obligation to warn the approaching British warships, because States have an obligation "not to allow knowingly its territory to be used for acts contrary to the rights of other States." Although the ICJ did not cite *Trail Smelter*, this language is reminiscent of *Trail Smelter*. In some respects, it distills the *Trail Smelter* holding into a broader principle by ignoring *Trail Smelter*'s emphasis on "fumes" and "serious injury."

A few decades later, the Court missed an opportunity to apply the *Corfu Channel* language to the nuclear field when Australia and New Zealand sued France for conducting atmospheric nuclear weapons testing.[110] At the time, neither Australia nor New Zealand sought compensation from France; rather, they sought a judicial opinion declaring that atmospheric nuclear tests are illegal. The Court dismissed these cases as moot because France had recently pronounced that it was ending atmospheric nuclear testing anyway.[111]

The joint dissenting opinion, however, pointed out that any potential future Australian claims for compensation due to radioactive fallout could turn on whether France's tests were legal (and therefore the case was not moot).[112] Along those lines, another dissenting judge—Judge De Castro—offered his take on whether these radioactive tests were legal. He first noted "the prohibition of *immissio* (of water, smoke, fragments, of stone) into

106 Corfu Channel (U.K. v. Alb.), Judgment, 1949 I.C.J. 4, 22 (April 9).

107 *Id.* at 10.

108 The U.K. unconvincingly argued it was Albania, *id.* at 15–16, while Albania speculated it could have been laid by Greece. *Id.* at 17.

109 *Id.* at 21–22 ("From all the facts and observations mentioned above, the Court draws the conclusion that the laying of the minefield which caused the explosion . . . could not have been accomplished without the knowledge of the Albanian Government.").

110 Nuclear Tests (Austl. v. Fr.), 1974 I.C.J. 253 (Dec. 20); Nuclear Tests (N.Z. v. Fr.), 1974 I.C.J. 457 (Dec. 20). Because these are mirror opinions, all subsequent cites will be to the Australia case.

111 *Nuclear Tests*, 1974 I.C.J. at 270–72.

112 *Id.* at 318 (joint dissenting opinion).

a neighboring property was a feature of Roman law."[113] Judge De Castro argues that this old Roman principle became incorporated into the contemporary international legal rule that states cannot use their territory to harm other states. Judge De Castro then cited *Trail Smelter* for the proposition that France should not be able to "deposit radioactive fallout" on Australian territory, and, if it did, then it had to pay compensation to Australia and New Zealand.[114] It is unclear from Judge De Castro's opinion whether he believes that that atmospheric nuclear testing would be unlawful *per se* as a "wrongful act," or only unlawful to the extent it causes a "trespass" onto Australian lands. This confusion is understandable given that Judge De Castro wrote before the International Law Commission split its state-responsibility study into two branches: wrongful acts, and the harmful consequences of other lawful activities.[115]

An ICJ majority finally did address the *Corfu Channel* language in the broader context of a state's environmental obligations when it issued its Advisory Opinion on the Threat or Use of Nuclear Weapons.[116] Before discussing the law of warfare, the Court considered whether human rights law or environmental law prohibited using nuclear weapons. Although the Court found that neither prohibited using nuclear weapons, it included the following statement in its discussion of environmental law:

> The existence of the general obligation of States to ensure that activities within their jurisdiction and control respect the environment of other States or areas beyond national control is now part of the corpus of international law relating to the environment.[117]

This opinion therefore articulates an international legal principle

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113 *Id.* at 388 (dissenting opinion of De Castro, J.).

114 This is the first time that the ICJ cited to *Trail Smelter*. Judge De Castro further questioned whether "intrusion or trespass into the territory of another is unlawful in itself, or only if it gives rise to damage." *Id.* at 389. *Trail Smelter*—as noted above—suggests that the trespass alone is not unlawful *per se*; instead it takes a trespass plus damages. *See supra* text accompanying footnote 104. In any event, this distinction, although intellectually interesting, is not entirely relevant here, because any hypothetical nuclear accident with cross-border environmental damage will have to encompass a "trespass plus damage."

115 *See infra* Section II(B)(3) for a more detailed description of the International Law Commission's work.

116 *Nuclear Weapons*, *supra* note 84, at 241–42.

117 *Id.*

that states must ensure activities within their jurisdiction "respect" other states' environments (the "no-harm principle").[118] Whether the state is respecting its neighbors' environments is only partially relevant, because the no-harm principle applies to *all* activities within a state's jurisdiction, including those by non-state actors that the state merely allows. One lingering question from this opinion, however, is whether states can meet their obligation to "ensure" that activities in their borders "respect" other states' environments by merely exercising due diligence, or whether the mere existence of damage alone means the duty has been breached. The next Section addresses this question in detail, but for now it is sufficient to note that in the *Nuclear Weapons* Advisory Opinion, the ICJ established that the no-harm principle is included within the "corpus" of international law.

The ICJ applied its *Nuclear Weapons* holding in its recent *Pulp Mills* case. That case involved Argentine claims that proposed pulp mills on the Uruguay River violated procedural and substantive obligations set forth in a bilateral treaty governing river use.[119] Argentina argued, in part, that Uruguay failed to take required measures to prevent pollution of the shared river.[120] In analyzing the treaty provisions, the Court cited *Nuclear Weapons*' language about the "general obligation" of sates to "respect" the environments of other states.[121] Notably the Court did not question whether Uruguay, as a matter of law, could face international liability for damage wrought by a private pulp mill operator, but instead proceeded to the factual inquiry. In the end, the Court found no conclusive evidence that Uruguay polluted the river, and so the Court held that Uruguay breached neither the treaty nor its general international law obligation not to harm Argentina's aquatic resources.[122]

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118 Although I term this to be a "principle," others believe that this is actually a customary "rule" instead. *See* Andrea Laura Mackielo, *Core Rules of International Environmental Law*, 16 ILSA J. INT'L & COMP. L. 257, 288 (2009). This is ultimately an academic debate because—as Judge Cançado Trindade points out—"rules" and "principles" are alternative sources of public international law.

119 Pulp Mills on the River Uruguay (Arg. v. Uru.), Judgment, 2010 I.C.J. 18 (Apr. 20). The Court concluded that Uruguay did, in fact, breach some procedural provisions of the treaty.

120 *Id.* at 73.

121 *Id.* at 78.

122 *Id.* at 101; *see infra* Section II(C)(1) for a discussion of whether *Pulp*

The ICJ has emphasized the no-harm principle with increasing clarity and consistency from *Corfu Channel* to *Nuclear Weapons* to *Pulp Mills*.[123] But the ICJ has never actually used this principle to assign liability in a case of cross-border environmental damage: *Corfu Chanel* involved a minefield explosion, *Nuclear Weapons* was an advisory opinion that did not address compensation, and *Pulp Mills* did not find any actual cross-border damage to Argentina. To support the proposition that states can incur liability for private nuclear operators' actions, we are still left—as Thomas W. Merrill aptly pointed out in the 1990s—relying on *Trail Smelter* plus arguable *dicta* from a smattering of ICJ opinions.[124] Prof. Merrill found this dearth of precedent disconcerting, versed as he was in the thick confines of American administrative and constitutional law.

But we must remember Judge Cançado Trindade's separate opinion in *Pulp Mills*. As he instructs, attorneys should search for general international legal principles wherever those principles may be. So under Cançado Trindade's reasoning, the lack of a binding ICJ precedent holding a state liable for private cross-border harm is not insurmountable. The ICJ language from the *Nuclear Weapons* advisory opinion may not be a technically binding precedent. And the no-harm principle may—or may not—be an official customary norm. But to carry legal weight before the

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Mills further suggests that states are not strictly liable for any harm.

123 *See* Gabcikovo-Nagymaros Project (Hung./Slovk.), 1997 I.C.J. 7, 41 (Sept. 25) ("The Court recalls that it has recently had occasion to stress, in the following terms, the great significance that it attaches to respect for the environment, not only for States but also for the whole of mankind: '. . . The existence of the general obligation of States to ensure that activities within their jurisdiction and control respect the environment of other States or of areas beyond national control is now part of the corpus of international law relating to the environment.'") (quoting *Nuclear Weapons*, *supra* note 84, at 241–42); *see also* Certain Activities Carried Out by Nicaragua in the Border Area (Nicar. v. Costa Rica), Judgment, I.C.J. Nos. 150 & 152, at 49 (Dec. 16, 2015), http://www.icj-cij.org/docket/files/150/18848.pdf (stating "[a]s the Court restated in the *Pulp Mills* case, under customary international law, '[a] State is . . . obliged to use all the means at its disposal in order to avoid activities which take place in its territory, or in any area under its jurisdiction, causing significant damage to the environment of another State'") (quoting *Nuclear Weapons*, *supra* note 84, at 56). The *Nuclear Weapons* language has also been favorably quoted by other international arbitral tribunals. *See* Iron Rhine Railway (Belg. v. Neth.), 27 R.I.A.A. 35, 66–67 (Perm. Ct. Arb. 2005).

124 Merrill, *supra* note 91, at 932–33.

ICJ, this no-harm principle merely has to be part of the "general principles of law recognized by civilized nations." The consistent invocations[125] of the ICJ's *Nuclear Weapons* language demonstrate that—at a minimum—the no-harm principle is a stand-alone international legal principle. Of course, the ICJ is only one of many authorities that may identify these "general principles of law recognized by civilized nations," joined by other international organs like the United Nations and the International Law Commission.

2. *United Nations Resolutions*

The relevant environmental law principle that has emerged from ICJ jurisprudence is: *States must ensure that activities within their jurisdictions and control respect the environments of other states or areas beyond national control*. Far from existing in a legal vacuum, this ICJ formulation was both influenced by, and reflected in, various United Nations documents, primarily the Stockholm (1972)[126] and Rio (1992)[127] declarations. Yet even as early as 1961, the United Nations General Assembly was issuing resolutions declaring that "international law imposes a responsibility on all States concerning actions which might have harmful biological consequences for the existing and future generations of peoples of other States."[128] And in the Resolution on Cooperation between States in the Field of Environment, the General Assembly further declared: "States must not produce significant harmful effects in zones situated outside their national jurisdiction."[129] Both of these resolutions discuss state obligations to refrain from *directly* harming other states' environments, but neither addresses the distinction between state activities themselves and private activities authorized by the state.

The 1972 Stockholm Declaration fills this void by declaring that all states have "the responsibility to ensure that activities

125 *See supra* note 123.

126 U.N. Conference on Environment, *Report of the United Nations Conference on the Human Environment*, U.N. Doc. A/Conf.48/14/Rev.1 (June 16, 1972) [hereinafter *Stockholm Declaration*].

127 U.N. Conference on Environment and Development, *Rio Declaration on Environment and Development*, U.N. Doc. A/Conf.151/26/Rev.1 (Vol. 1), annex I (Aug. 12, 1992) [hereinafter *Rio Declaration*].

128 G.A. Res. 1629 (XVI), at 9 (Oct. 27, 1961).

129 G.A. Res. 2995 (XXVII), ¶ 1 (Dec. 15, 1972).

within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction."[130] This language was copied *verbatim* into Principle 2 of the Rio Declaration.[131] The Stockholm and Rio Declarations therefore suggest that an installation state has a "responsibility" to ensure that any authorized activities within their jurisdiction—including private nuclear power plant operation—do not harm another state's environment.

Professor Andrea Laura Mackielo argues that the Stockholm and Rio Declarations "provide clear evidence" that an *opinio juris* exists to support a no-harm obligation under international law.[132] Her view is that that these two declarations denote a customary norm. But as Prof. Mackielo points out, other commentators have argued that these declarations reflect principles only, rather than normative rules.[133] This debate about whether the Stockholm/Rio declarations reflect "principles" or "custom"—although interesting—is tempered by Judge Cançado Trindade's instruction that stand-alone international legal principles are alternative sources of international law in addition to custom. If Professor Mackielo is correct, then these two declarations represent a binding customary rule that applies to all installation states. Yet even if the declarations do not comprise a customary rule, they would still be binding on installation states because they provide strong evidence of a "general principle of law recognized by civilized nations."[134] The significance of the Rio/Stockholm declarations does not turn on whether they reflect a custom. Rather, their significance is that they show consistency with the ICJ's view in *Nuclear Weapons* that states have an obligation to ensure that activities within their borders do not harm other states' environments.

3. *The Work of the International Law Commission*

The United Nations created the International Law

130 *Stockholm Declaration*, *supra* note 126, at 5 (Principle 21).

131 *Rio Declaration*, *supra* note 127, annex I.

132 Mackielo, *supra* note 118, at 266–67.

133 *Id.* at 265–66.

134 Pulp Mills on the River Uruguay (Argentina v. Uruguay), 2010 I.C.J. 18, 132–34 (Apr. 20) (separate opinion by Cançado Trindade, J.) (translated by author). Note that Professor Mackielo herself argues this very point. Mackielo, *supra* note 118, at 266.

Commission in 1948 with the purpose of promoting the "progressive development of international law and its codification."[135] In the 1960s and 1970s, the United Nations charged the International Law Commission with studying and recommending codification generally for state responsibility doctrine.[136] In 1978, the Commission decided to segregate state responsibility for "wrongful acts" from State responsibility for "injurious consequences arising out of acts not prohibited by international law."[137] In 1997, the Commission decided to further split its examination of the "injurious consequences" topic into two subtopics: prevention and allocation of loss.[138] It finished its work on prevention in 2001,[139] and it completed its work regarding liability in 2006.[140]

Regarding prevention, the Commission first notes that "prevention of transboundary harm arising from hazardous activities is an objective well emphasized by principle 2 of the Rio Declaration . . . and confirmed by the ICJ in its advisory opinion on the *Legality of the Threat or Use of Nuclear Weapons*."[141] Draft Article 3 provides that "[t]he State of origin shall take all

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135 G.A. Res. 174(II), at art. 1 (Nov. 21, 1947). "Codification" in this context refers to the drafting and ultimate ratification of broad global conventions. The Vienna Convention on the Law of Treaties, for instance, grew out of a recommendation from the International Law Commission.

136 *See, e.g.*, G.A. Res. 1686 (XVI), ¶ 3 (Dec. 18, 1961). For a complete list of all General Assembly resolutions addressing state responsibility, see *Analytical Guide to the Work of the International Law Commission: General Assembly Action*, INT'L LAW COMM'N, http://legal.un.org/ilc/guide/9_6.shtml#gaacts (last updated Jan. 12, 2016).

137 See Pemmaraju Sreenivasa Rao, Principles on the Allocation of Loss in the Case of Transboundary Harm Arising Out of Hazardous Activities: Introductory Note, UNITED NATIONS, http://legal.un.org/avl/ha/palcthaoha/palcthaoha.html (last visited Sept. 17, 2016). For a detailed discussion of this history, along with a critique of this conceptual distinction, see Boyle, supra note 94.

138 Int'l Law Comm'n, Rep. on the Work of Its Forty-Ninth Session, UN Doc. A/52/10, at 59 (1997), http://legal.un.org/docs/?path=../ilc/documentation/english/reports/a_52_10.pdf&lang=EFSXP.

139 Int'l Law Comm'n, Draft Articles on Prevention of Transboundary Harm from Hazardous Activities, UN Doc. A/56/10, at 148 (2001), http://legal.un.org/ilc/texts/instruments/english/commentaries/9_7_2001.pdf [hereinafter Draft Articles].

140 Int'l Law Comm'n, Draft Principles on the Allocation of Loss in the Case of Transboundary Harm Arising Out of Hazardous Activities, UN Doc. A/61/10 (2006), *available at* http://legal.un.org/ilc/texts/instruments/english/commentaries/9_10_2006.pdf [hereinafter Draft Principles].

141 Draft Articles, *supra* note 139, at 148.

appropriate measures to prevent significant transboundary harm or at any event minimize the risk thereof."[142] This is a narrower formulation than the ICJ language from *Nuclear Weapons*, which says that states have an obligation "to ensure that activities within their jurisdiction and control respect the environment of other States or areas beyond national control." It is also narrower than the Stockholm/Rio Declarations, which do not *caveat* a state's obligation to prevent harm as consisting only of a duty to take all "appropriate measures" to prevent harm.[143] Yet despite this narrower formulation, the International Law Commission's phrasing is entirely consistent with ICJ precedent that allows for vicarious state liability in international law for the acts of private parties.[144] States *are* responsible in international law for the actions of private entities operating within their territories if a private entity causes cross-border environmental harm.

To briefly return to our hypothetical, if Germany sued France before the ICJ, France would not likely prevail by arguing that it bears no international legal responsibility for the acts of a private nuclear plant operating within its jurisdiction. It would not matter that France itself did not commit the harm to Germany through a wrongful act, because committing a wrongful act is not a prerequisite to finding that a State breached its obligations under international law.

C. *Strict State Liability for the Acts of Private Nuclear Operators*

The preceding Section shows that Germany could successfully initiate a lawsuit against France. But would proving injury alone be sufficient? Or would Germany need to establish that negligent French regulatory oversight contributed to the accident?

International dispute precedents are much less helpful here. As Professor Handl points out, *Trail Smelter* did not address the strict-liability issue because Canada had already agreed to authorize the tribunal to decide compensation questions.[145] And

142 *Id.* at 153.

143 This difference in phrasing may be relevant to determining whether states can be held strictly liable for any nuclear accident. *See infra* Section II(C).

144 *See supra* Section II(B)(1).

145 Gunther Handl, Balancing of Interests and International Liability for

Corfu Channel restates *Trail Smelter* in the context of a state breaching its duty to warn other states that a minefield was in its territorial waters.[146] Perhaps the closest judicial analogue is the 1981 *Cosmos 954* case, which entailed a Canadian claim that a Soviet nuclear powered satellite caused damage in Canadian arctic territory.[147] Canada rested its claim partially on the concept that "absolute liability for . . . activities involving the use of nuclear energy is . . . a general principle of international law.[148] But because this claim was settled *ex gratia* by the Soviet Union—and because this claim also arose under the 1972 Space Objects Liability Convention[149]—it does not provide much clarity on whether states are strictly liable for private nuclear accidents.

Gunther Handl, writing in 1988, noted that "current international practice is insufficient to warrant the inference that customary international law at this time encompasses strict source state liability for abnormally dangerous activities in general or for transboundary risks of nuclear power production in particular."[150] Not surprisingly, therefore, this strict-liability question flummoxed

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the Pollution of International Watercourses: Customary Principles of Law Revisited, 13 CAN. Y.B. INT'L L. 156, 168 (1975).

146 *Id.* at 166 (arguing that it was Albania's knowledge of the minefield that led to an international obligation to notify the British ships, rather than international law imposing "strict liability" for the explosion and resulting damage); *see also* BIRNIE ET AL., *supra* note 31, at 153 (stating that the *Corfu Channel Case* dealt with a "known risk" to other states).

147 Claim against the Union of Soviet Socialist Republics for Damage Caused by Soviet Cosmos 954, 18 I.L.M. 902 (1979).

148 *Id.* Canada further argued that "the principle of absolute liability applies to fields of activities having in common a high degree of risk. It is repeated in numerous international agreements and is one of 'the general principles of law recognized by civilized nations.'" *Id.* (quoting Statute of the International Court of Justice, *supra* note 71, at art. 38.)

149 Article II of the 1972 Space Objects Liability Convention imposes strict liability on the "launching State" for any resulting damage, and so this treaty would have provided an independent, conventional basis for applying strict liability. Convention on International Liability for Damage Caused by Space Objects, March 29, 1972, 24 U.S.T. 2389.

150 Handl, *supra* note 49, at 238–39. Note that in the same article, Professor Handl postulates that strict source state liability would constitute a "general principle of law" under the ICJ Statute because strict liability is in force domestically in most national legal systems. *Id.* at 239. Without commenting on the accuracy or validity of this claim, I believe that it is more helpful to focus on the second "strand" of the "general principles of law" source (*i.e.*, the stand-alone international legal principles that Judge Cançado Trindade focuses on) because those do not depend on the vagaries of domestic law.

commenters after the Chernobyl accident.[151] More recently, a leading textbook stated, "the more difficult question we have to consider . . . is whether states are also liable in international law for transboundary damage caused without fault[.]"[152] This Article argues that states *should* be strictly liable in international law for any cross-border damage following a private nuclear accident. But without clear judicial precedent and with some countervailing strands in the International Law Commission's work, this would likely become a vehemently contested issue in any state-to-state litigation following a nuclear accident.

1. *ICJ Precedent*

Even though the ICJ has not squarely addressed the strict-liability question, it has obliquely addressed this issue. In the *Pulp Mills* case, Argentina argued that Uruguay had an "obligation of result" to ensure that the aquatic environment near the pulp mill was not harmed.[153] The Court disagreed, holding instead that Uruguay's obligation is "to act with due diligence in respect of all activities which take place under [its] jurisdiction."[154] Professor Boyle argues that this conclusively decides that international law imposes a fault-based regime rather than strict liability—"the ICJ confirms that the obligation is one of due diligence . . . rather than result."[155]

Yet the ICJ was interpreting a specific treaty provision in the *Pulp Mills* decision. That treaty text—"the parties undertake to protect and preserve the aquatic environment and, in particular, to prevent its pollution, *by prescribing appropriate rules and [adopting appropriate] measures*"[156]—almost compels the Court to find a due-diligence standard because of its focus on appropriate "rules" and "measures." And in its concluding paragraphs rejecting Argentina's substantive claim for damage, the Court stated, "[i]t

151 See Malone, *supra* note 74, at 237 ("What is not clear under international law is the applicable standard for determining liability."); see also Boyle, *supra* note 94, at 16 (noting the "uncertainty" surrounding the appropriate standard for installation state liability after Chernobyl).

152 BIRNIE ET AL., *supra* note 31, at 217.

153 Pulp Mills on the River Uruguay (Argentina v. Uruguay), 2010 I.C.J. 18, 78 (Apr. 20).

154 *Id.* at 79.

155 Boyle, International Law and the Liability for Catastrophic Environmental Damage, 105 AM. SOC'Y INT'L L. PROC. 423, 424 (2011).

156 Pulp Mills on the River Uruguay, 2010 I.C.J. Rep. at 77.

follows from the above that there is no conclusive evidence in the record to show that Uruguay has not acted with the requisite degree of due diligence *or* that the discharges of effluent from the Orion (Botnia) mill have had deleterious effects or caused harm to living resources or to the quality of the water or the ecological balance of the river[.]"[157] If international law imposed only a due-diligence obligation, then the Court did not need to engage in a factual inquiry about whether the mill actually harmed the environment, as the Court could have resolved this case as a matter of law. The term *or* in the concluding sentence implies that Uruguay had a responsibility to ensure that paper mill did not cause environmental damage *even if* it acted with due diligence. At a minimum, the opinion is sufficiently ambiguous that Professor Boyle's belief that it "conclusively" decided the strict-liability question is overstated.

Nor have subsequent ICJ decisions clarified *Pulp Mills*. In *Certain Activities Carried Out by Nicaragua in the Border Area*, Costa Rica argued that Nicaragua's dredging of the Lower San Juan River violated both its procedural and substantive obligations under international environmental law.[158] In particular, Costa Rica argued that Nicaragua's river dredging caused environmental harm to Costa Rican lands on the right bank of the river.[159] The Court ultimately found that Nicaragua's activities did not harm Costa Rica's environment.[160] But before making that evidentiary finding, the Court cited *Pulp Mills* for the proposition that "under customary international law, '[a] State is . . . obliged to use all the means at its disposal in order to avoid activities which take place in its territory, or in any area under its jurisdiction, causing significant damage to the environment of another State.'" The court did not temper this statement with any suggestion that Costa Rica would need to *also* show that Nicaragua breached a conduct-based standard. But the absence of any actual harm meant that the Court did not need to actually resolve the strict-liability question to decide the case.

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157 *Id.* at 101.

158 Certain Activities Carried Out by Nicaragua in the Border Area (Nicar. v. Costa Rica), Judgment, I.C.J. Nos. 150 & 152, at 43 (Dec. 16, 2015), http://www.icj-cij.org/docket/files/150/18848.pdf.

159 *Id.* at 44.

160 *Id.* at 50.

2. *International Law Commission*

The International Law Commission has more directly addressed this issue, and its work may provide the strongest argument *against* finding strict liability applicable in any state-to-state litigation following a nuclear accident. In its Draft Articles on Prevention of Transboundary Harm from Hazardous Activities ("Draft Articles on Prevention"), the Commission explained:

> The obligation of the State of origin to take preventive or minimization measures is one of due diligence. It is the conduct of the State of origin that will determine whether the State has complied with its obligation under the present articles. The duty of due diligence involved, however, is not intended to guarantee that significant harm be totally prevented, if it is not possible to do so. In that eventuality, the State of origin is required, as noted above, to exert its best possible efforts to minimize the risk. In this sense, it does not guarantee that the harm would not occur.[161]

This commentary says that states breach their international obligations to other states *only* if they fail to exercise due diligence in regulating the hazardous activity. Without a breach of an international obligation, it follows that there can be no resulting state liability. Such an argument appears compelling and dispositive.[162]

Yet a closer look at the Commission's work reveals nuances and ambiguities. As explained above, the International Law Commission split its original study of "injurious consequences arising out of acts not prohibited by international law" into two subtopics: prevention and liability. So the Draft Articles on Prevention focus on state obligations and state responsibility. In part, they provide that states must require prior authorization for any activity that could cause significant cross-border harm,[163] consult with other states regarding preventive measures,[164] and

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161 Draft Articles, *supra* note 139, at 154 (emphasis added).

162 *See* Thomas Gehring & Markus Jachtenfuchs, *Liability for Transboundary Environmental Damage: Towards a General Liability Regime*, 4 EUR. J. INT'L L. 92, 106 (1993) (noting that under the International Law Commission's work, "the primary responsibilities of states lies in the areas of prevention of harm, supervision of dangerous activities, and, last but not least, provision of liability regimes guaranteeing adequate compensation of damage suffered by victims").

163 Draft Articles, *supra* note 139, at 156–57, art. 6.

164 *Id.* at 160, art. 9.

develop emergency and contingency plans.[165]

Any violation of these preventive articles would presumably give rise to state responsibility, because the state would be violating a primary obligation of prevention owed to other states. This is so even if harm does not occur. If, for instance, a state did not develop emergency plans before authorizing a nuclear power plant, then another state could argue that the installation state has already violated its preventive duties.[166] Given this context, it becomes understandable that the Commission references a due-diligence standard, because the focus is on what states need to do to prevent harm from occurring—*i.e.*, the focus in on state responsibility. But once harm actually occurs, it implicates principles of *liability* (rather than responsibility). Here, the Draft Articles on Prevention may be less probative than the Commission's Draft Principles on the Allocation of Loss in the Case of Transboundary Harm Arising Out of Hazardous Activities ("Draft Principles on Liability").[167] As international environmental law scholars have argued, "it seems clear that the Commission envisages civil liability and state responsibility as potentially complementary regimes."[168] Thus, the Commission's Draft Articles on Prevention may not be dispositive on this question.

Ultimately, any argument for finding vicarious strict liability not applicable to nuclear accidents relies on the notion that a state's obligation under international law extends only to its responsibilities duty to perform diligent oversight rather than to prevent actual harm. But this may be too narrow a conception of state obligation, at least with respect to well-known *ultra-hazardous* activities. In the environmental context, "ultra-hazardous activities" are lawful activities which can cause

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165 *Id.* at 168, art. 16.

166 The remedy in international law for such a violation—in the absence of any harm—would presumably be a procedural remedy requiring the installation state to actually perform emergency planning.

167 *See* Mackielo, *supra* note 118, at 292–93 (noting that "the obligation of prevention and responsibility for harm are two different concepts" and that "compliance with [the obligation of prevention] may not exonerate a state from its duty to repair should any damage be caused"); *see also* Allan Rosas, *Issues of State Liability for Transboundary Environmental Damage*, 60 NORDIC J. INT'L L. 29, 29 (1991) ("While state responsibility usually entails liability (at least *in abstracto*), liability does not necessary presuppose state responsibility.").

168 BIRNIE ET AL., *supra* note 31, at 224.

devastating harm, even if the likelihood of that harm occurring is very low—nuclear power is a paradigmatic example.[169] The potential risks from operating a nuclear power plant are much greater than the potential risks of operating a pulp mill or smelter.[170] Some commentators therefore believe that when a state authorizes an ultra-hazardous activity, the state takes on an *additional* obligation to actually prevent cross-border harm, rather than just perform due diligence.[171] Or, to put it differently, fully discharging a state's *responsibility* to prevent harm would not preclude that state from facing *liability* if harm from an ultra-hazardous activity occurs.

In this regard, the International Law Commission's recent work on liability is perhaps more instructive than its work on prevention. In its commentaries on its Draft Principles on Liability, the Commission explains that it is "*assumed* that duties of due diligence under the obligations of prevention have been fulfilled . . . the focus of the present draft principles is on damage caused *despite the fulfillment* of such duties."[172] This demonstrates that even if a state discharges all of its preventive duties under the Commission's Draft Articles on Prevention, the Draft Principles on Liability still describe subsequent legal obligations if harm actually occurs. The Commission further notes:

> Hazardous and ultra-hazardous activities . . . involve complex operations and carry with them certain inherent risks of causing significant harm. In such matters, it is widely recognized that it would be unjust and inappropriate to make the claimant shoulder a heavy burden of proof of fault or negligence in respect of highly complex technological activities. . . . Strict liability is recognized in many jurisdictions, when assigning liability for inherently dangerous or hazardous activities. The case for strict liability for ultra-hazardous activities was held to be the most proper technique both under common and civil law to enable victims of dangerous and ultra-hazardous activities to recover compensation without having to establish proof of fault

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169 *Id.* at 218 (specifically mentioning "nuclear power plants" as an example of an ultrahazardous activity).

170 *See, e.g., supra* note 42 and accompanying text (discussing damage caused by the Chernobyl incident).

171 BIRNIE ET AL., *supra* note 31, at 224; *see also id.* at 151 (noting that some commentators have limited the "absolutist" view of liability to only ultra-hazardous activities).

172 Draft Principles, *supra* note 140, at 120 (emphasis added).

> on the basis of what is often detailed technical evidence.[173]

Though this passage exists in the context of requiring States to establish an internal legal system that imposes strict liability on the operator of the hazardous activity,[174] strong arguments exist for extending strict liability to vicarious state liability as well.

Notably, the International Law Commission's Draft Principles on Liability contemplate a direct state role in providing funds for remediating cross-border harm even if the state acted with due diligence. Draft Principle 4 requires states to impose strict liability on any hazardous-activity operators.[175] So far, this is comparable to the existing nuclear liability conventions.[176] But Draft Principle 4 goes further than the nuclear liability conventions by saying if the operator cannot provide adequate compensation, then the "State of origin" must ensure additional funds are available.[177] As Professor Mackielo points out, under these Draft Principles, "the final responsibility to ensure that adequate compensation is provided rests with the State."[178] The Commission did not propose to graft an additional fault-based liability regime before this supplemental State liability kicked in; rather, the same strict-liability rules would apply.

3. *The Polluter-Pays Principle and Strict Liability*

Finally, the "polluter pays" principle suggests that strict liability should apply. Principle 16 of the Rio Declaration states: "National authorities should endeavor to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution."[179] This is commonly referred to as the "polluter-pays principle," and it serves to ensure that the economic costs of addressing pollution are internalized within the costs of operating the activity. If polluters know that they are ultimately responsible for cleaning up their pollution, then they will either take steps to avoid pollution or incorporate cleanup costs into their operation. This principle is

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173 *Id.* at 156.
174 *Id.* at 151 (Principle 4).
175 *Id.*
176 *See supra* Section I(C).
177 Draft Principles, *supra* note 140, at 151.
178 Mackielo, *supra* note 118, at 293.
179 *Rio Declaration*, *supra* note 127, at annex I.

consistent with strict liability because it recognizes that if pollution occurs, then *someone* will need to pay to remediate that pollution; strict liability ensures that the actual polluter—rather than third parties—will bear that cost.[180]

If a nuclear operator lacks sufficient assets to fully clean up any resulting cross-border pollution, then the polluter-pays principle suggests that the installation state should be responsible for any shortfall. The installation state derives benefits from the plant and bears responsibility for authorizing an ultra-hazardous activity notwithstanding the risk of significant cross-border harm. Taking into account the polluter-pays principle, the installation state should bear the risk of having to rectify any shortfall itself.

On the whole, therefore, the better argument is that strict liability should apply in any state-to-state claim for nuclear damage. But this is not certain. And this unpredictability provides a contrast to the clear liability rules set forth in the nuclear liability conventions. Yet even if a due-diligence standard were to apply, this could ultimately end up being a distinction without a difference. The Draft Articles on Prevention explain that the due-diligence standard must take into account the degree of risk associated with the activity potentially causing cross-border harm.[181] Because ultrahazardous activities are associated with ultrahigh risks, those activities "require a much higher standard of care in designing policies and a much higher degree of vigor on the part of the State to enforce them."[182] If the standard of care for ultrahazardous activities is higher, then it necessarily becomes easier for a victim state to prove that an installation state breached that standard. At a certain point, the standard of care can become so high that it ends up looking a lot like strict liability, because proving an accident becomes almost sufficient to prove a breach.

D. *Damages and Remedies*

Once the victim state proves that the installation state breached its duty by causing injury to a neighboring state, the next set of questions involve damages and remedies.[183] First, is damage

180 *See* BIRNIE ET AL., *supra* note 31, at 324 (arguing that "strict liability is a better approximation [than negligence] of the polluter-pays principle").

181 Draft Articles, *supra* note 139, at 154.

182 *Id.*

183 The analysis in this Section is identical whether strict liability or due diligence applies because this Section assumes that if due diligence applies,

to the environment *per se* a cognizable damage under international law, or does there need to be a nexus to commercial interests? Second, assuming that damage to the environment is recognized, then what remedy is appropriate to rectify that cross-border environmental harm?

1. *Damage to the Environment* Per Se

The alleged damages that the United States sought to recover from Canada in the *Trail Smelter* adjudication were those in respect of "cleared land and improvements," "uncleared land and improvements," "livestock," "property in the town of Northport," and "business enterprises."[184] Notably, none of these claims involve damage to the environment *alone*; they involve damage to individuals' *property* and businesses.

Trail Smelter's exclusive focus on property damage makes sense given that it was decided in the 1930s and 1940s. As Judge Cançado Trindade explains, the international environmental law "awakening" did not begin in earnest until the 1960s or 1970s.[185] The increasing environmental "consciousness" is evident in the nuclear liability conventions, which went from containing very sparse definitions of *nuclear damage* to now containing expansive definitions that explicitly identify environmental harm.[186] And it is evident in the International Law Commission's work, whose Draft Principles on Liability specifically identify "environmental damage" as being compensable.[187] The corresponding commentary explains that the Commission included environmental harm *per se* within the definition of damage to "build upon trends that have already become prominent as part of recently concluded international liability regimes."[188]

Finally, it is evident in the work of the United Nations

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then the victim state has already proved a breach of that standard of care. Of course the victim state would still need to prove causation—that the suffered environmental damage was a result of a nuclear accident—but causation issues are beyond the scope of this Article. I will assume that the victim state has also proved causation (once again recognizing that this may be assuming a large part of any case).

184 Trail Smelter (U.S. v. Can.), 3 R.I.A.A. 1905, 1920 (1938 & 1941).

185 Pulp Mills on the River Uruguay (Argentina v. Uruguay), 2010 I.C.J. 18, 157 (Apr. 20, 2010) (separate opinion by Cançado Trindade, J.).

186 *See supra* Section I(A).

187 Draft Principles, *supra* note 140, at 127–34.

188 *Id.* at 128.

Compensation Commission. The United Nations Security Council established the United Nations Compensation Commission to process claims and pay compensation for losses and damage suffered as a direct result of Iraq's 1990 Kuwait invasion, including claims for property damage and deaths, as well as environmental harm.[189] Iraq argued that claimants were entitled to compensation for only environmental loss that had an economic value, such as fisheries and crops.[190] The Commission disagreed, finding Iraq responsible for "pure environmental damage" as well.[191] Especially in the context of hazardous activities, it is no longer controversial to assert an international legal claim for damage to the environment that exists independent of any property or economic claim.

So if *Trail Smelter* were decided today—and if the United States also brought a claim to clean up a polluted river in addition to claims for damaged crops—it is unlikely that the tribunal would grant the United States relief on the crops claim without *also* providing relief on the polluted-river claim. Likewise, if a nuclear power plant damaged another state's environment, then that would be a recoverable type of damage under international law.

2. *"Restitution" for Nuclear Damage*

The trickier question is not whether environmental harm constitutes "damage" (it plainly does), but rather how to go about *repairing* that damage. In the *Pulp Mills* case, the ICJ explained that "customary international law provides for restitution as one form of reparation for injury, restitution being the re-establishment of the situation which existed before occurrence of the wrongful act."[192] This is a refinement of the *Factory at Chorzow* holding, which said that "reparation must, so far as possible, wipe out all

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189 S.C. Res. 692, ¶ 3 (May 20, 1991); *see also* S.C. Res. 687, ¶¶ 16–18 (Apr. 3, 1991).

190 Compensation Comm'n, Rep. and Recommendations Made by the Panel of Commissioners Concerning the Fifth Instalment of "F4" Claims, ¶ 52, U.N. Doc. S/AC.26/2005/10 (2005) [hereinafter Fifth Instalment].

191 *Id.* ¶¶ 53–58. Although the Commission was applying Security Council resolution 687, it was also charged with applying other "relevant rules of international law," and it explained that its decision to allow recovery for pure environmental damage was not "inconsistent" with "general international law." *Id.* ¶ 58.

192 Pulp Mills on the River Uruguay (Arg. v. Uru.), Judgement, 2010 I.C.J 18, at 103 (Apr. 20, 2010).

the consequences of the illegal act and re-establish the situation which would, in all probability, have existed if that act had not been committed."[193]

At first blush, the focus on "wrongful acts" could suggest that the line of international cases starting with *Factory at Chorzow* would not apply to cross-border nuclear damage, because those cases involve wrongful acts *per se* rather than the harmful consequences of an otherwise lawful activity. But states have a legal obligation to ensure that activities within their borders do not have cross-border effects.[194] International law must therefore fashion a remedy for any breach of that obligation. *Pulp Mills* recognizes that restitution—the remedy in *Factory at Chorzow*—applies beyond *wrongful acts*, so that defendant states must re-establish the situation that existed before they caused an *injury*. This creates harmony between the legal remedies for two broad types of state acts that can lead to international legal liability.

Thus, under international law, the remedy for any cross-border environmental harm is *restitution*. Restitution entails the reinstatement costs that bring the environment back to the condition that existed before the harm.[195] Any restitution "must be appropriate to the injury suffered, taking into account the nature of the wrongful act having caused it."[196] Similar to the nuclear liability conventions, determining whether a proposed remedial measure is "appropriate" can quickly become complicated.[197] First, as the United Nations Claims Commission explained when

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193 Chorzow Factory Case, 1927 P.C.I.J. (ser. A) No. 9, at 21 (July 16); *see also* Int'l Law Comm'n, *supra* note 96, at art. 34 (defining full reparation as "restitution, compensation and satisfaction, either singly or in combination").

194 *See supra* Section II(B).

195 *See* Compensation Comm'n, Rep. and Recommendations Made by the Panel of Commissioners Concerning the Third Instalment of "F4" Claims, ¶¶ 47–48, U.N. Doc. S/AC.26/2003/31 (2003) [hereinafter Third Instalment] ("[T]he appropriate objective of remediation is to restore the damaged environment or resource to the condition in which it would have been if Iraq's invasion and occupation of Kuwait had not occurred.").

196 Pulp Mills on the River Uruguay, 2010 I.C.J at 104.

197 As discussed *supra* in Part I, the nuclear liability conventions leave a significant amount of discretion to the competent court, which has to determine under *national law* whether a proposed environmental reinstatement measure is "reasonable." There could be significant variance across jurisdictions—despite the conventional goal of ensuring harmony across the Contracting Parties. This Section, by contrast, discusses how *international law* would likely address this problem.

adjudicating claims for environmental damage following Iraq's Kuwait invasion,[198] international tribunals must consider any pre-existing causes of damage when determining the proportion of de-contamination costs to be borne by the offending state.[199] Because very few environments currently exist in a pristine state, this could become an important factual dispute between the victim state and installation state.

Once victim states get over this preliminary hurdle, others still remain. If, for instance, radioactive fallout endangered a specific species, would restitution require the installation state to re-populate that species so that it was no longer endangered? The nuclear liability conventions speak in terms of *reasonable* reinstatement measures.[200] This "reasonableness" standard provides a good approximation for the ICJ's notion of "appropriate" restitution, and it has support across various international authorities. The International Law Commission, for instance, also adopted a reasonableness standard in its Draft Principles by including "the costs of reasonable measures of reinstatement of the environment" within its definition of *damage*.[201] And the United Nations Compensation Commission used a reasonableness test when assessing claims for environmental damage.[202] This provides strong evidence that victim states can recover only *reasonable* reinstatement costs under international law, rather than *all* reinstatement costs.

Like the nuclear liability conventions, though, the Commission's Draft Principles offer little guidance what reinstatement measures are reasonable, other than stating "the reference to 'reasonable' is intended to indicate that the costs of such measures should not be excessively disproportionate to the

198 *See supra* text accompanying footnote 189 for a description of this tribunal.

199 *See* Third Instalment, *supra* note 195, ¶ 47 ("The contribution of any pre-existing or subsequent causes of damage (where such causes can be identified) should be considered, not in determining the restoration objective to be achieved by remediation, but in determining the proportion of the costs of remediation that can reasonably be attributed to Iraq's invasion and occupation of Kuwait.").

200 Vienna Convention Consolidated Text, *supra* note 6, at 128, art. I(1)(m); Convention on Supplementary Compensation, *supra* note 7, at art. I(g); Paris Convention Amendments of 2004, *supra* note 4, at 16, art. 1(a)(viii).

201 Draft Principles, *supra* note 140, at 122.

202 Third Instalment, *supra* note 195, ¶ 48.

usefulness resulting from the measure."[203] The United Nations Compensation Commission is somewhat more helpful, stating:

> The Panel considers that, in assessing what measures are 'reasonably necessary to clean or restore' damaged environment, primary emphasis must be placed on restoring the environment to pre-invasion conditions, in terms of its overall ecological functioning rather than on the removal of specific contaminants or restoration of the environment to a particular physical condition. For, even if sufficient baseline information were available to determine the exact historical state of the environment prior to Iraq's invasion and occupation of Kuwait, it might not be feasible or reasonable to fully recreate pre-existing physical conditions.[204]

As this quote demonstrates, the international forum will have a large degree of discretion when determining what constitutes a "reasonable" reinstatement measure. Assume, for instance, that an endangered bird's habitat is destroyed by a nuclear accident, and that it would cost 1 billion USD to re-populate that bird in a similar habitat a hundred kilometers away, versus 10 billion USD to reinstate that damaged habitat. Given those choices, the court could find that establishing a similar population elsewhere at a fraction of the cost is sufficiently similar to reinstatement that it would be "inappropriate" and unreasonable to require the full 10 billion USD reinstatement measure.

Also, imposing a reasonableness standard means that international tribunals would still have to judge the propriety of a proposed reinstatement measure *even in the absence of a cheaper alternative*. The above hypothetical presumed that a significantly cheaper alternative existed: repopulating the endangered bird species somewhere else. But even if no other suitable habitats existed, and the cost for reinstatement remained 10 billion USD,

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203 Draft Principles, *supra* note 140, at 131.

204 Third Instalment, *supra* note 195, ¶ 48; *see also* Fifth Instalment, *supra* note 190, ¶ 42 ("In the third 'F4' report, the Panel stated that the appropriate objective of remediation is to restore the damaged environment or resource to the condition in which it would have been if Iraq's invasion and occupation of Kuwait had not occurred. However, the Panel stressed that regard must be had to a number of considerations in applying this objective to a particular claim, including, inter alia, the location of the damaged environment or resource and its actual or potential uses; the nature and extent of the damage; the possibility of future harm; the feasibility of the proposed remediation measures; and the need to avoid collateral damage during and after the implementation of the proposed measures.").

the international court would need to determine whether it was reasonable to require the installation state to remediate the damaged habitat. A court could conceivably decide that repopulating the species would simply not justify an expenditure of 10 billion USD.

To take another hypothetical, what if it costs 50 billion USD to de-contaminate and reinstate a damaged river's habitat, and that the river provides a unique ecosystem that cannot be replicated elsewhere? Under that scenario, a court could determine that spending 50 billion USD is reasonable because that cost is not "excessively disproportionate" to the benefits of reinstating a unique ecosystem.[205] Or a court may determine that restoring the river is unreasonably costly, and that a less expensive de-contamination is the only reasonable remedial measure.

Further, if the court determines that remediation beyond de-contamination would be unreasonable, then the question becomes whether any other form of compensation is appropriate. In *Pulp Mills*, the ICJ said that "where restitution is materially impossible or involves a burden out of all proportion to the benefit deriving from it, reparation takes the form of compensation."[206] And in its Fifth Installment on F4 Claims, the United Nations Compensation Commission discussed a methodology called "Habitat Equivalency Analysis," which can be used to help determine the extent of compensation necessary to account for the loss of environmental resources.[207] Yet the United Nations Compensation Commission continued to emphasize that any award of compensation based on Habitat Equivalency Analysis or other similar methodologies must still be "appropriate and reasonable."[208]

Determining appropriate compensation for cross-border environmental harm will therefore be a long and fact-intensive

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205 Draft Principles, *supra* note 140, at 131.

206 Pulp Mills on the River Uruguay (Arg. v. Uru.), Judgement, 2010 I.C.J. 18, 103 (Apr. 20, 2010); s*ee also* Trail Smelter (U.S. v. Can.), 3 R.I.A.A. 1905, 1920 (1938 & 1941) ("Where the tort itself is of such a nature as to preclude the ascertainment of the amount of damages with certainty, it would be a perversion of fundamental principles of justice to deny all relief to the injured person, and thereby relieve the wrongdoer from making any amend for his acts.").

207 For a full discussion of this methodology, as well as the inherent difficulties with assessing monetary values to "pure environmental damage," *see* Fifth Instalment, *supra* note 190, ¶¶ 73–82.

208 Id.

inquiry—the five separate decisions and hundreds of pages that the United Nations Compensation Commission spent on just environmental claims are proof.[209] Any litigation could easily become mired in a factually complicated analysis of dueling reinstatement proposals and assessments about whether proposed reinstatement measures meet reasonableness tests.

3. *Preventive Remedies Following Nuclear Damage*

Finally, another potential remedy could be prospective "preventive" measures.[210] In *Trail Smelter*, the tribunal ordered Canada to control the future operation of the smelter so that it no longer harmed the United States, illustrating a tribunal's power to prescribe measures to prevent repetition of environmental damage.[211] Because any significant nuclear accident is likely to render that nuclear power plant permanently inoperable, an international court would not be in the position to address additional preventive measures at the afflicted power plant. Yet the victim state could argue that the court should take the preventive measure of ordering any *remaining* nuclear power plants in the installation state to shut down if accidents at those plants would have cross-border effects.

Trail Smelter suggests that such an argument should fail because Canada retained the right to operate the smelter, and provide compensation if need be.[212] Further, as Professors Birnie,

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209 For all the United Nations Compensation Commission's decisions on environmental damages, *see* Compensation Comm'n, Rep. and Recommendations Made by the Panel of Commissioners Concerning the First Instalment of "F4" Claims, U.N. Doc. S/AC.26/2001/16 (2001); Compensation Comm'n, Rep. and Recommendations Made by the Panel of Commissioners Concerning the Second Instalment of "F4" Claims, U.N. Doc. S/AC.26/2002/26 (2002); Third Instalment, *supra* note 195; Compensation Comm'n, Rep. and Recommendations Made by the Panel of Commissioners Concerning Part One of the Fourth Instalment of "F4" Claims, U.N. Doc. S/AC.26/2004/16 (2004); Compensation Comm'n, Rep. and Recommendations Made by the Panel of Commissioners Concerning Part Two of the Fourth Instalment of "F4" Claims, U.N. Doc. S/AC.26/2004/17 (2004); Fifth Instalment, *supra* note 190.

210 See BIRNIE ET AL., *supra* note 31, at 226–28 for a general discussion of preventive remedies in the environmental law context.

211 Trail Smelter (U.S. v. Can.), 3 R.I.A.A. 1905, 1974 (1938 & 1941).

212 *Id.* at 1966 ("[T]he Trail Smelter shall be required to refrain from causing any damage through fumes in the State of Washington; the damage herein referred to and its extent being such as would be recoverable under the decisions of the courts of the United States in suits between private

Boyle, and Redgwell point out, "in several environmental disputes the applicant has asked the court to order cessation of a potentially harmful activity. No such order has yet been made."[213] If the court became convinced that the installation state could not operate its remaining plants safely, perhaps the court would consider ordering either additional protective measures or—as a drastic last resort—shutdown.[214] This is one area where the type of liability regime may end up influencing the appropriate remedy. If the victim state proves that the installation state failed to regulate with due diligence, then the argument for taking preventive measures with respect to any remaining nuclear plants becomes stronger than if strict liability is applied.

CONCLUSION

Ultimately, the "general rules of public international law" provide answers to the three questions posed at the beginning Part II. But these answers come with varying degrees of confidence. States bear international legal responsibility for the actions of private nuclear operators[215], and are responsible for environmental damage *per se*[216] (this much is relatively certain). But whether that responsibility is "strict" or fault based is less certain.[217] Nor do states possess easy access to an international tribunal.

Along these lines, an international environmental law textbook sums up the current state of international law with respect to nuclear liability as follows:

> Without further agreement on whether state responsibility for nuclear damage is strict or requires a failure of diligence, on a forum in which claims can be brought, and on how the burden of reparation should be allocated among public and private actors, it is difficult to conclude that state responsibility at present affords a sufficiently principled basis for the settlement

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individuals. The indemnity for such damage should be fixed in such manner as the Governments, acting under Article XI of the Convention, should agree upon.").

213 BIRNIE ET AL., *supra* note 31, at 227.

214 The ICJ has this type of injunctive power. *See, e.g.*, Whaling in the Antarctic (Austl. v. Japan), Judgment, 2014 I.C.J. 226 (Mar. 31) (holding that Japan needed to revoke any existing authorizations, permits or licenses granted in relation to its researching whaling missions).

215 *See supra* Section II(A).

216 *See supra* Section II(D)(1).

217 *See supra* Section II(C).

> of international claims arising out of accidental nuclear damage. It is likely to remain an unpredictable option for any state seeking redress, *and there is no doubt that in most cases reliance on the revised civil liability and compensation schemes provided by the 1997 Protocol to the Vienna Convention and the 2004 Protocol to the Paris Convention will be preferable*. This is especially the case now that non-party claims are possible.[218]

This passage highlights the many hurdles that an international dispute regarding a nuclear accident would face. Finding an appropriate international forum would be just the first of many challenges. The victim state would then need to either establish that strict liability applies, or show that the installation state did not exercise due diligence. Finally, the victim state would need to prove causation and demonstrate that its proposed reinstatement measures are reasonable. The Conventions are therefore preferable when addressing nuclear accidents that cause minor-to-moderate cross-border damage. A forum is guaranteed, and the Conventions dispel any doubt about whether strict liability or due diligence applies. Establishing causation and proving reasonable reinstatement measures could still remain troublesome, but these should not be insurmountable obstacles following a minor or moderate accident. The Conventions' orderly nature is better than the unpredictability that would follow an international claim.

Yet the Conventions are not well-equipped to handle compensation following a significant nuclear accident. If an accident causes billions of dollars' worth of cross-border damage, then the Conventions could potentially fall apart from the pressure of the claims. First there would be a mad dash to recover losses from the operator before insolvency inevitably sets in. Then the installation state could start discriminating against victims from other states. The only remaining remedy would likely be for the victim state to file an international claim against the installation state. In a state-to-state dispute, the available amounts of compensation would be higher, but actually procuring a judgment—and then enforcing that judgment—remain speculative. Cross-border victims, therefore, are stuck without an easy and likely means to address their injuries.

One potential way out of this thicket is to develop a new

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218 BIRNIE ET AL., *supra* note 31, at 520.

liability regime that combines the orderliness of the existing private liability conventions along with the higher compensation amounts that are available through an international dispute. This would take the form of a *public* liability convention (similar to the 1972 Space Objects Liability Convention[219]), that would exist alongside the Paris or Vienna Conventions. Under this putative convention, all contracting parties would agree that if the nuclear operator becomes insolvent, then the installation state is strictly liable for any resulting cross-border harm. The International Atomic Energy Agency (IAEA) created a working group to contemplate such a convention after Chernobyl. But it floundered when the IAEA decided to focus its energies on amending the Vienna Convention.[220] This neglect was unfortunate, as the deficiencies of the existing private liability conventions and the need for a separate public liability convention has become only more apparent in the intervening years. The Fukushima accident, in particular, demonstrates that the necessary compensation amount after a severe nuclear accident far exceeds the capacities of the existing liability conventions.

Further, that IAEA working group would likely have an easier time now than it did in the late 1980s. International environmental law has blossomed since Chernobyl. The ICJ's *Nuclear Weapons* advisory opinion, the Rio Declaration, and the International Law Commission's Draft Principles on Liability all postdate the late 1980s, and so were not available to the IAEA working group charged with studying state liability. It is not remotely controversial to argue that states can have public liability for the acts of private corporations. The strict-liability question remains vexing. But even if this Article is wrong and public international law does not impose strict liability, strong arguments exist for applying strict liability in this context.[221] And nothing prohibits the IAEA from creating a *conventional* international legal requirement that imposes strict liability on installation states.[222]

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219 *See supra* note 149.

220 A brief history of the IAEA's work on a potential state liability convention is described in IAEA, *supra* note 2, at 18. *See also* Handl, *supra* note 49, at 228–29.

221 In short, establishing causation and proving damages are complicated and challenging enough. States suffering cross-border environmental harm, therefore, should not have the additional burden of trying to prove that the installation state's regulatory oversight was negligent or otherwise faulty.

222 The Space Objects Liability Convention provides a clear example of

Until such a public liability convention enters into force, the best available option for victim states suffering from costly environmental damage after a catastrophic nuclear accident is to initiate an international claim against the installation state. The speculative nature of recovery is preferable to the near-certainty of inadequate compensation under the private liability conventions.

where strict public liability was imposed *by convention* rather than by custom or principle. *See supra* note 149 and accompanying text.