The *Burlington* Court's Flawed Arithmetic

by Walter Mugdan

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On May 4, 2009, the U.S. Supreme Court handed down its decision in *Burlington Northern & Santa Fe Railway Co. v. United States.*[1] The decision is of major significance with respect to two areas of Superfund jurisprudence—"arranger" liability, and divisibility or apportionment of harm. This Article is concerned only with the latter issue and, moreover, only with one specific element of that issue.

Much has already been written about this decision, but few of those writings have focused on the mathematical equation used by the *Burlington* court to assign a specific apportioned share of the liability for the Superfund site in question to the two defendant railroad companies. The focus of this Article is the court's arithmetic, which the author contends is fundamentally flawed.

I. Facts of the Case

As described in the Supreme Court decision, the facts of the case (which are critical to understanding the trial court's arithmetic) are these:

Brown & Bryant (B&B) operated an agricultural-chemical packaging and distribution company in California. (See diagram of facility at the end of this Article.) The company started operation in 1960. In 1975, it extended its operations onto an adjacent, smaller parcel of land owned by two railroad companies that are the corporate predecessors of Burlington Northern and Union Pacific Railroads, two of the chief defendants in this case. B&B continued operations at the combined parcel until 1989.

B&B purchased agricultural chemicals from manufacturers, including Shell Oil Company and Dow Chemical. From Shell, it purchased chemicals named D-D and Nemagon, and from Dow, it purchased Dinoseb. Some of the chemicals were purchased in bulk and arrived by common carrier (truck or rail). Upon arrival, the chemicals were transferred from the tank trucks or rail cars to bulk storage tanks for later repackaging and resale.

Spills occurred during the transfer operations, as well as elsewhere on the site, causing soil and groundwater contamination. In due course, B&B became a Superfund site. D-D, Nemagon, and Dinoseb were the contaminants of principle concern.

By the early 1990s, the U.S. Environmental Protection Agency (EPA) and California had spent some $8 million on cleanup work. The railroads, under order from EPA, had spent a further $3 million. (Significant additional expenditures would later be necessary to complete the cleanup.)

In 1992, the railroads sued B&B to recover costs, and EPA and California sued the railroads and Shell for cost recovery. The cases were consolidated.

II. The Litigation

In the *Burlington* trial, the opposing parties pursued what the court characterized as a "scorched earth" approach: the federal and state governments contended that the railroads were jointly and severally liable for the entire cost of site cleanup, and so the plaintiffs did not brief or argue the question of how liability might appropriately be apportioned. The defendants maintained that they should not be held liable at all, and similarly did not brief or argue the principles or mechanics of apportionment. The district court held both railroads and Shell liable, but also held the harm to be divisible. The court apportioned 6% of the liability to Shell, and then turned its attention to the two railroads. (This Article will not further consider the question of Shell's liability, but will hereafter focus on the railroads' liability.)

Unaided by informed argument from either side, the court sua sponte looked to the evidence adduced at trial and invented a simple mathematical equation, based upon which it concluded that the railroads apportioned share of the liability should be 9%.

Author's Note: Any opinions expressed are those of the author and do not necessarily reflect the views of the U.S. Environmental Protection Agency. Some of the ideas in this Article evolved through discussions with the author's colleagues Sharon Kivowitz and William Tucker, to whom the author is indebted.

1. 129 S. Ct. 1870, 39 ELR 20098 (2009).

The parties appealed to the U.S. Court of Appeals for the Ninth Circuit, which held that there was not a reasonable basis for apportioning the liability of the defendants, and they should therefore be held jointly and severally liable. The parties appealed again to the Supreme Court, which reversed the circuit court and upheld the trial court's approach to apportionment as reasonable (though it did not conclude that this is the only way in which apportionment could have been performed).

III. The Trial Court's Arithmetic

We return now to the trial court's calculation of the railroads' apportioned share. The court arrived at a value for that share by multiplying together the following three factors:

A. *Geography:* The fraction of the total land on which B&B operated that was owned by the railroads, which the court calculated to be 19% (or 0.19); multiplied by . . .

B. *Time:* 45% (0.45), being the fraction of the total time that B&B operated during which those operations included the railroad parcel; multiplied by . . .

C. *Contaminants*: 66% (or 0.66), reflecting the court's finding that only two of the three contaminants of principle concern had been managed on the railroads' property.

Thus, the trial court's equation was: 0.19 x 0.45 x 0.66 = 0.06, or a calculated 6% share. The court then multiplied this figure by 1.5, representing a 50% "margin of error" factor, for a final apportioned share of 0.09, or 9%.[2]

IV. The Flaw in the Arithmetic

There is a fundamental flaw in the trial court's arithmetic that appears not to have been recognized during any of the subsequent litigation. The court(s) seem not to recognize that if you multiply any two fractions together, the product is always a smaller fraction. Add more fractions to the equation, and the product becomes smaller still.

The trial court's arithmetic is not designed in such a way that the total shares will add up to 100%. That they *should* total 100% is clear, provided one includes into the mix the "orphan" shares, i.e., the shares of any responsible parties that are identified but unable to pay, plus the shares assigned to parties that cannot be properly identified.

To illustrate the *Burlington* court's fundamental flaw, let us assume for the sake of simplicity that B&B—the operator of the site and the owner of all but the railroads' parcel—was the only other responsible party. B&B's corresponding percentages in the trial court's three categories would be:

Geography:	81% (0.81) of the land area
Time:	100% (1.00) of the time
Contaminants:	100% (1.00) of the contaminants

Multiplying those three fractions together yields 81%. Adding that to the railroads' 6% yields only 87%, when of course it should account for 100%, because in this simplified hypothetical, the railroads and B&B are the only potentially responsible parties (PRPs).[3]

Alternatively, one might argue that B&B should be assigned 100% in each of the three categories—Geography, Time, and Contaminants—because it operated, not only on the portion of the site it owned, but also on the portion of the site owned by the railroads (during the years that chemicals were managed on the railroads' portion). In that case, 100% x 100% x 100% = 100%. Adding this to the railroads' apportioned 6% share yields 106%[4] when, again, it should only account for 100%.

Here's another example: imagine a single site, owned and operated for 20 years by two successive, viable PRPs: Company A and Company B. Each company owned and operated the site for 10 years. Company A discharged chemical X during its 10 years; Company B discharged chemical Y for its 10 years. The quantities and toxicities of chemicals X and Y are comparable. Any rational observer would say that their shares, if divisible at all, should be 50% each. But if you multiply the *Burlington* trial court fractions together, here's the result: both companies would be assigned 100% of the Geography x 50% of the Time x 50% of the Contaminants. Multiply these together, and you find that each PRP's "apportioned" share would be only 25%, leaving a 50% orphan share at a site with no orphans.

These examples demonstrate why the *Burlington* trial court's arithmetic approach does not work. Either one ends up with too low or too high a percentage when all the PRPs are taken into account. A meaningful apportionment methodology should result in a total of exactly 100%, even if some or all of the apportioned shares are assigned to orphans, i.e., PRPs that are unknown, defunct, or impecunious.

V. Alternative Arithmetic Approaches

The *Burlington* trial court used three categories in its mathematical equation: Geography, Time, and Contaminants. But other categories can be imagined and arguably make as much or more sense as these three. The most obvious would be toxicity or contribution to risk. Risk assessors routinely make calculations of the human health or ecological risks attributable to various chemical contaminants found at a site. Their mathematical calculations are typically framed in such a way that one can assign a numerical value to the portion of the total calculated risk attributable to each different chemical. For example, a risk assessment might support the statement that chemical X contributes 75% of the risk at a given site and chemical Y contributes 25%. If different PRPs are responsible for different chemicals, and if numerical risk attributions like these are available, would the *Burlington* court have added a fourth fraction to the multiplication, and made the result even smaller? Similarly, one

2. The court also concluded, albeit based on imprecise evidence, that no more than about 10% of all the B&B spills occurred on the railroads' property. This was generally consistent with the 9% apportioned share that the court had calculated.

3. Even if we use the 9% figure for the railroads (including the court's "error factor"), the result is 90%—still not the necessary 100%.

4. Or 109%, if one uses the 9% figure for the railroads' share.

might add another fraction expressing relative contributions to the cost of cleanup, since different chemicals may be associated with differing disposal or treatment costs. Each such additional fraction, though perhaps appearing superficially to be "meaningful" on its own, simply makes the final result smaller and less meaningful.

It has been suggested that taking the average of the percentages assigned to a PRP for the various categories might yield a more meaningful result. In the *Burlington* case, the average of the three values assigned by the court to the railroads is 43.33%; and the average of the three B&B percentages would be either 93.66% or 100% (depending on which value one uses for the Geography category). Adding these two averages together yields a total of either 137% or 143.33%. Obviously this approach doesn't work either.[5]

If one accepts the *Burlington* court's general approach at all (which this author does not), then arguably the best way to apply it would be to calculate the relative shares of the PRPs, and then use a simple factor to scale those shares (including any orphan shares) either up or down as necessary, so that the total shares equal 100%. In our hypothetical, simplified version of the B&B site, here's how this would work:

- Under the trial court's arithmetic, the railroads are calculated to have a 6% share.
- B&B, as the only other PRP in the simplified assumption above, is calculated to have an 81% share.
- The ratio of 6% to 81% is 1 to 13.5.
- The total of the two percentages is 87%.
- To get from 87% to 100%, you must multiply both shares by 1.15, yielding shares of 6.9% and 93.1% respectively.
- The total of 6.9% and 93.1% is a sensible 100% . . . and the ratio of these two figures is still 1 to 13.5.[6]

Granted, B&B is still bankrupt, and the orphan share under this approach is actually larger than what resulted from the *Burlington* trial court (because the trial court assigned the railroads a 9% share, by adding a 50% "error factor" to the 6% calculated share). But at least this approach has mathematical integrity, in that it will always result—by definition—in 100% of the responsibility being apportioned among all the PRPs, including orphans. If one had started this mathematical exercise using the 9% figure for the railroads, rather than 6%, the end result would have been marginally different, but the principle would be the same.

VI. Conclusion

This author submits that because the trial court did not have the benefit of informed argument by the parties, the court made a fundamental mathematical error when it started to multiply fractions together. It ignored the fact that this process invariably leads to smaller and smaller fractions, and that when all the PRPs are taken into account, it is likely that the total apportioned shares among all PRPs (including orphans) will be less than 100%—which by definition they must not be.

There is a mathematical way to resolve that fundamental flaw, described above. But the underlying question remains: does this series of arithmetic steps mean anything? Is it really a sensible way to value the relative responsibility of different parties in a case where harm is determined to be divisible? The author submits that each Superfund site is likely to present such unique facts that one size will never fit all. For those sites where apportionment is deemed appropriate at all—presumably still a small minority of sites[7]—the approach taken to effectuate that apportionment may also be unique.

Diagram of Brown & Bryant Facility

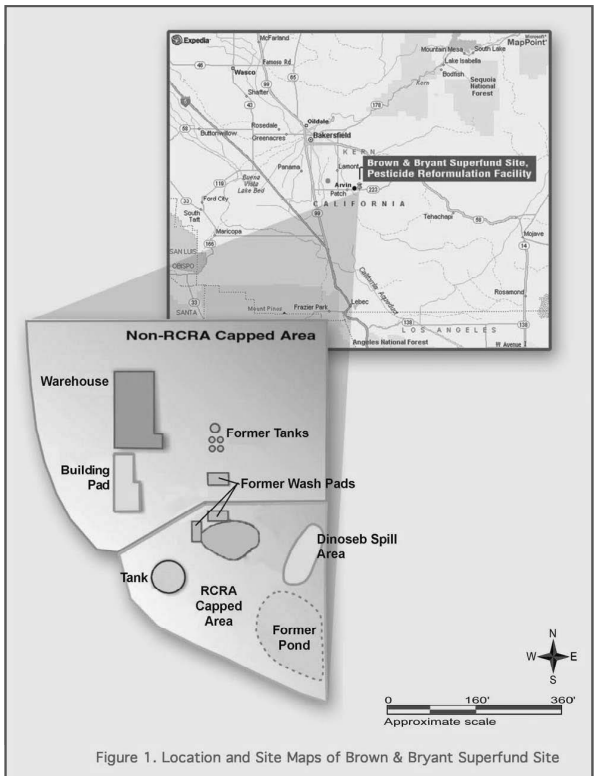

Figure 1. Location and Site Maps of Brown & Bryant Superfund Site

5. Here's another simple example: an owner and a separate operator are both involved at a site for its entire operation. They would both be at 100% in the Geography and Time categories under the *Burlington* court's approach, because both were involved with the whole site for the whole time. This will guarantee that, with the averaging approach, the final combined total for both PRPs will be more than 100%, an absurd result. To make the averaging approach work, one would have to force each of the three categories to total no more than 100% among all PRPs. See text, *supra*, for how that can be done.
6. Using the trial court's equation, B&B's share might be calculated to be 100% (as discussed earlier). If this is added to the railroads' assigned 6% share, you get a total of 106%. The ratio of 6% to 100% is 1 to 16.66. To get from 106% back down to 100%, multiply both shares by 0.9433, yielding shares of 5.66% and 94.33%, respectively. The total of those two figures is 100%, and the ratio of one to the other is still 1 to 16.66. The same technique can be used with any combination of shares, always yielding a final value of 100% and always maintaining the ratio or relative positions of the PRPs (including orphans) to one another.
7. The Supreme Court's discussion of the liability standard supports the conclusion that joint and several liability remains the "default" standard in most CERCLA cases. The Court cited with approval *United States v. Chem-Dyne Corp.*, 572 F. Supp. 802, 13 ELR 20986 (S.D. Ohio 1983), and noted that the *Chem-Dyne* approach has been "fully embraced by the Courts of Appeals." 556 U.S. ___ (2009), slip op. at 13.