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FROM KEPONE TO EXXON VALDEZ OIL AND BEYOND: AN OVERVIEW OF NATURAL RESOURCE DAMAGE ASSESSMENT*

In July 1975, officials from the Virginia State Department of Health learned that employees of the Life Science Product Company ("Life Science"), in Hopewell, Virginia, had been poisoned by a toxic chemical known as Kepone. Life Science had produced Kepone under contract for Allied Chemical Corporation ("Allied Chemical"), the original developer and manufacturer. Shortly thereafter, state officials discovered that both Life Science and Allied Chemical had unlawfully discharged Kepone into freshwater tributaries of the James River. In addition to poisoning their own employees, Life Science and Allied Chemical had also contaminated Virginia's atmosphere, soil, and waterways with Kepone.

Fourteen years later, in March, 1989, the Exxon *Valdez* ran aground off the coast of Alaska releasing over eleven million gallons of crude oil into the Alaskan environment. Within days, cleanup crews and government officials were removing the oil and assessing the environmental damage. However, the government's cleanup activities following the Exxon spill were more regulated, more intense, and certainly more expensive for Exxon than the government activity following the Kepone discovery. Although the environmental damages caused by Allied Chemical and Exxon were not equally significant, the difference in subsequent restorative actions can be largely attributed to changes in federal environmental law and public opinion.

Immediately following the Exxon *Valdez* incident, environmentalists, economists, and governmental officials began to assess the damage. Pursuant to federal law, the parties involved in the Exxon cleanup activities were entitled to compen-

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sation for their efforts.¹ These protective laws, however, were not in force when the Kepone contamination was discovered. Although the environmental damages resulting from Kepone contamination were extensive, the prevailing law did not entitle the Commonwealth of Virginia to restorative compensation and the monetary damages imposed did not reflect the environmental damages inflicted.² Instead, Allied Chemical was charged with the maximum criminal fine allowable under existing federal law.³

The environmental damages caused by the Kepone and Exxon incidents still affect the ecosystems of Virginia and Alaska. Millions of dollars have been spent to clean up the damage in each case, but questions remain as to the real costs of such damage. Federal regulations currently provide procedures which assist natural resource trustees in quantifying environmental damage to natural resources caused by hazardous wastes and oil spills.⁴ After the Exxon spill, these assessment procedures were used to assess damages in excess of \$3 billion, an amount tempered by Exxon's \$1.1 billion settlement. The \$3 billion amount included both "use" and "nonuse" values, arrived at by using a damage assessment method which uses public surveys to determine "passive-use" values.⁵ Because CERCLA and the same natural resource damage assessment procedures were not in place when the Kepone incident occurred, Allied Chemical was charged only with a criminal fine which did not accurately reflect the damage done, nor distinguish between use and non-use values.

Although both the Kepone and Exxon incidents spawned hundreds of personal injury lawsuits and other damage claims, this paper focuses on the ability to assess environmental damage generated by such disasters. Section II focuses on the Kepone case and the criminal penalties imposed. Section III reviews federal and state natural resource damage assessment

1. The Comprehensive Environmental Response, Compensation and Liability Act of 1980 § 107, 42 U.S.C. § 9607 (1988).

2. See *infra* notes 23-28 and accompanying text.

3. See *infra* notes 20, 27-28 and accompanying text.

4. See generally 43 C.F.R. §§ 11.10-93 (1994).

5. See *infra* part IV.

regulations, the *Ohio v. Department of the Interior*⁶ decision, and the future of natural resource damage assessment. The current regulations were promulgated in 1991, in light of the *Ohio* decision in which the Court of Appeals for the District of Columbia held that the measure of damages should reflect restoration costs and that market value is only one of many factors to be considered when assessing damages. Section IV explores the assessability of "passive-use" values and non-market injuries, through the use of alternative assessment procedures, such as contingent valuation studies. Had such valuation concepts been applied to the Kepone incident, Allied Chemical would have owed millions more to the people of Virginia. Finally, Section V looks at the emergence of litigation-driven science following the Exxon *Valdez* oil spill and its growing effect on environmental law and science.

II. THE KEPONE INCIDENT AND THE PENALTIES IMPOSED

A. *The Kepone Contamination*

From 1966 to 1975, Allied Chemical produced Kepone, THEIC, and TAIC at its Hopewell manufacturing complex.⁷ As part of its normal business operations, Allied Chemical discharged its chemical manufacturing wastes into freshwater tributaries of the James River, a principal Virginia waterway that flows into the Chesapeake Bay.⁸ Life Science, owned and operated by two former Allied Chemical employees, had entered into a "tolling contract" with Allied Chemical and began manufacturing Kepone in March 1974.⁹ Less than one year later, in

6. 880 F.2d 432 (D.C. Cir. 1989).

7. *Allied-Signal, Inc. v. Commissioner*, 63 T.C.M. (CCH) 2672, 2673 (T.C. 1992) (3d Cir. 1992), *aff'd without opinion*, 54 F.3d 767 (1995) (hearing in United States Tax Court concerning whether expenses relating to the Kepone incident were tax deductible and containing an excellent recitation of the facts and litigation surrounding the Kepone incident). Kepone is a highly toxic chemical pesticide developed by Allied Chemical during the late 1940s and early 1950s. It was marketed primarily in Europe as an insecticide in potato farming, but small amounts were also sold in Central America for use in banana groves and in the United States for use in ant traps. THEIC and TAIC are biologically inactive chemicals used in commercial wire manufacture. *Id.*

8. *Id.*

9. *Id.* Under a tolling contract, one company processes raw materials supplied by

July 1975, officials from the Virginia State Department of Health ordered Life Science to cease operations because the Department had learned that many Life Science employees and their family members had been poisoned by Kepone.¹⁰

The activities of Life Science and Allied Chemical resulted in Kepone contamination of Virginia's atmosphere, soil, and waterways. The United States Environmental Protection Agency ("EPA") found Kepone particulates in the atmosphere twenty miles away from the plant, in addition to extensive Kepone contamination of the Hopewell facility and the surrounding area.¹¹ Unacceptable levels of Kepone were found in the James River and its local tributaries, as well as in shellfish and finfish taken from the river.¹² In response to these reports, Virginia Governor Mills E. Godwin closed the James River and portions of the Chesapeake Bay to commercial fishing in December 1975.¹³

B. *The Criminal Charges and Sentence Imposed*

As a result of the Kepone incident, hundreds of personal injury and other damage claims were filed against Allied Chemical.¹⁴ Approximately 10,500 persons alleging to have been harmed by Kepone contamination, including Life Science employees and their families, fishermen and other members of the Chesapeake Bay seafood industry, and the Virginia Water Control Board, sought to recover damages in excess of \$25 billion.¹⁵ At the request of Virginia officials, Allied Chemical had

another company which retains title to the raw materials and sells the processed chemical compound to its customers. The first company then receives a "tolling" fee for each unit produced. *Id.*

10. *Id.* at 2674. At least 62 current and former Life Science employees suffered from Kepone poisoning. *Id.*

11. *Id.*

12. *Id.*

13. *Id.* The James River remained closed to fisherman for 13 years. Rex Springston, *Signs of Life After Disaster*, RICH. TIMES-DISPATCH, July 2, 1995, at A1.

14. *Allied-Signal*, 63 T.C.M. (CCH) at 2674.

15. *Id.* at 2675-76. Claims by Life Science employees, their families, and others aggregated approximately \$85 million; claims by almost 400 fishermen, alleging that the closing of the James River and Chesapeake Bay impaired their livelihood aggregated \$24 million; a class action suit brought against Allied Chemical on behalf of some 10,000 fishermen and other members of the Bay-area seafood industry aggregat-

voluntarily decontaminated the Life Science plant in September 1975, spending approximately \$800,000 on the cleanup efforts.¹⁶ However, additional cleanup expenses were incurred by the Commonwealth of Virginia, the City of Hopewell, the EPA, the Army Corps of Engineers, and other government agencies involved in the investigation and its subsequent cleanup.¹⁷

On May 7, 1976, a grand jury returned three indictments against Allied Chemical. One was for 940 counts of unlawful discharges of Kepone, THEIC, and TAIC wastes by Allied Chemical at its Hopewell complex between 1971 and 1974. Another was for aiding and abetting Life Science in the unlawful discharge of Kepone waste from 1974 through 1976.¹⁸ Allied Chemical pled *nolo contendere* to all 940 counts in the first indictment.¹⁹ On October 5, 1976, Judge Robert R. Merhige sentenced Allied Chemical to pay the maximum fine on all 940 counts, \$2,500 per count for counts 1 through 456 and \$25,000 per count for counts 457 through 940, for a total fine of \$13,240,000.²⁰ Judge Merhige stated that he was "satisfied

ed \$25 billion; and the Virginia Water Control Board's suit against Allied Chemical claimed \$3.5 million in civil penalties. *Id.* at 2675.

16. *Id.* at 2675. Allied Chemical buried contaminated materials found at or near the plant site and decontaminated 33 railway cars of water. *Id.* In addition to cleanup activities, the company also sponsored health tests for its employees and residents of Hopewell and donated approximately \$88,000 to the Medical College of Virginia, which had treated several former Life Science employees affected by Kepone.

17. *Id.*

18. *Id.* Allied Chemical had government permits to discharge manufacturing wastes into local waterways; however, the first indictment stated that Allied Chemical's permit applications failed to list the Kepone, THEIC, and TAIC discharges. *Id.* Each of the 940 counts represented a single day's discharge; 628 counts were for THEIC and TAIC, 87 counts for TAIC and Kepone, and the remaining 225 counts for Kepone alone. *Id.* at 2675-76. Had Allied Chemical listed Kepone on its permit, the company probably would have received approval to discharge the toxic chemical. Robert H. Sand, Esq., Remarks at the *University of Richmond Law Review* State of the Chesapeake Bay Symposium (Mar. 2, 1995).

19. *Allied-Signal*, 63 T.C.M. (CCH) at 2676. Allied Chemical initially pled not guilty to all three indictments, but changed its plea to *nolo contendere* for the first indictment on August 19, 1976. In the United States District Court for the Eastern District of Virginia, Judge Robert R. Merhige, Jr. accepted this plea over the objection of the United States Attorney, William B. Cummings. Allied Chemical was acquitted on all counts of the second and third indictments. *Id.*

20. *Id.* at 2677; see Clean Water Act § 309(c)(1)(B), 33 U.S.C. § 1319(c)(1)(B) (1988 & Supp. V 1993); Rivers and Harbors Act § 407, 33 U.S.C. § 3411 (1988). Although it may seem small in light of the Exxon settlement, this was the largest fine imposed for environmental damage up until that time. The Honorable Robert R.

that [Allied Chemical] would have been found guilty, or they wouldn't have pled *nolo*," and that "Allied knew it was polluting the waters."²¹ In addition to punishing the company, Judge Merhige was hoping to send a message to other corporate polluters. He said, "I hope after this sentence, that every corporate official, every corporate employee that has any reason to think that pollution is going on, will think, 'If I don't do something about it now, I am apt to be out of a job tomorrow.' I want the officials to be concerned when they see it."²²

Although Judge Merhige sentenced Allied Chemical to the maximum criminal fine possible, he was concerned that the fines could not be used to directly benefit the victims of Kepone contamination.²³ Because the criminal fines could not be allocated to the Commonwealth of Virginia, Judge Merhige stated that he would consider a reduction in the fines in light of "what actions, if any, [had] been voluntarily taken by [Allied Chemical] to alleviate the horrendous effects that have occurred."²⁴ Consequently, Allied Chemical created the Virginia Environmental Endowment Fund and transferred \$8,000,000 to it.²⁵ The Endowment was created to alleviate the effects of Kepone on the environment and the affected persons and to generally improve and enhance the quality of the environment in Virginia.²⁶

In January 1977, Judge Merhige modified Allied Chemical's sentence by setting fines for counts 740 through 940 at \$25,000 per count, for a total of \$5,000,000.²⁷ He also granted Allied Chemical five years' probation for counts 1 through 740.²⁸ The

Merhige, Jr., Remarks at the *University of Richmond Law Review* State of the Chesapeake Bay Symposium (Mar. 2, 1995).

21. *Allied-Signal*, 63 T.C.M. (CCH) at 2677.

22. *Id.*

23. *See id.* at 2676-77. Judge Merhige wanted the people most affected to be compensated although he was "satisfied . . . that this cannot be done under the law." *Id.* at 2677.

24. *Id.* at 2677; *see id.* at 2677-80 (describing the conversations and negotiations regarding Allied Chemical's "voluntary" contributions).

25. *Id.* at 2680.

26. *Id.*

27. *Id.*

28. *Id.* Allied Chemical had filed a motion to reduce the \$13,240,000 fine to \$1,483,000, the minimum provided by law. On behalf of the Department of Justice, United States Attorney Cummings opposed a reduction in the fine, arguing that Al-

sentence imposed upon Allied Chemical was a criminal fine, the maximum amount established by statute. The dollar amount was not based upon the environmental damages incurred, nor the costs of restoration or replacement. At the time, the Comprehensive Environmental Response, Compensation and Liability Act did not exist,²⁹ and natural resource damage assessments were not required by federal law. Although cleanup costs were expected to exceed \$20 million, Judge Merhige was basically limited in sentencing to the statutory maximum available for permit violations.³⁰ Although Allied Chemical and its outside experts conducted intensive research regarding methods of retrieving Kepone from the James River and on the effects of incineration of Kepone waste, such research was not used to quantify the damage incurred pursuant to natural resource damage assessment regulations.

III. NATURAL RESOURCE DAMAGE ASSESSMENT REGULATIONS

Under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 ("CERCLA"), certain categories of potentially responsible parties are now liable for all removal and remedial costs incurred by the government when natural

lied Chemical would claim a tax deduction for the payment to the Endowment and thus "effectively further reduce the fine and lessen its penal and deterrent purpose." *Id.* He was proven correct. Allied Chemical deducted the \$8,000,000 that it had transferred to the Virginia Environmental Endowment Fund as an "ordinary and necessary business" expense under section 162(a) on its 1977 federal income tax return, as well as the \$49,323 that it had paid in legal expenses relating to the organization of and contribution to the Endowment. *Id.* The United States Tax Court held that, because Allied Chemical made the \$8 million payment to the Endowment "with the virtual guarantee that the sentencing judge would reduce the criminal fine by at least that amount," the payment was not "voluntary" and thus not exempt under section 162(f). *Id.* at 2682. The court also held that even though the payment was made to the Endowment to ensure that the people of Virginia received or benefitted from a portion of the criminal fine instead of being "paid to the government," the reality was that the payment was a "fine or similar penalty" within the meaning of section 162(f). *Id.* at 2683.

29. See *infra* part III.

30. *Allied-Signal, Inc.*, 63 T.C.M. (CCH) at 2683. Although natural resource damage assessment was not required by federal law, Judge Merhige considered Kepone's effect on the environment when he charged Allied Chemical with the highest possible fine. In sentencing Allied Chemical, Judge Merhige hoped to warn other polluters that they would not be able to get away with unlawful discharges or environmental atrocities. *Id.*

resources are damaged by a release of hazardous substances.³¹ Natural resource damages encompass "damages for injury to, destruction of, or loss of natural resources, including the reasonable costs of assessing such injury, destruction, or loss. . . ."³² The Clean Water Act ("CWA"), amended by the Oil Pollution Act of 1990 ("OPA"), creates similar liability for natural resource damages resulting from the discharge of oil into navigable waters.³³

A. *Natural Resource Damage Assessment Regulations*³⁴

Together, CERCLA and OPA constitute the legislative foundation for natural resource damage assessment and compensatory liability. According to these federal statutes, natural resource trustees, which are government agencies, shall be compensated for environmental damages caused by the release of hazardous substances or oil spills.³⁵ To assist federal, state, and Tribal natural resource trustees in identifying the "best available" procedures for assessing natural resource damages, the Department of the Interior ("DOI") has promulgated natural resource damage assessment ("NRDA") regulations.³⁶ Natural

31. 42 U.S.C. § 9607(a) (1988 & Supp. V 1993).

32. *Id.* § 9607(a)(4)(C). An actionable "injury" is "a measurable adverse change, either long- or short-term, in the chemical or physical quality or the viability of a natural resource. . . ." Natural Resource Damage Assessments, 43 C.F.R. § 11.14(v) (1994).

33. 33 U.S.C. § 1321(f); Oil Pollution Act of 1990 § 1002, 33 U.S.C. § 2702 (Supp. V 1993).

34. 43 C.F.R. §§ 11.10-.93 (1994).

35. 42 U.S.C. § 9607(f); 33 U.S.C. § 2706.

36. 43 C.F.R. §§ 11.10-.43 (1994). For a history of natural resource damage assessment regulations, see 51 Fed. Reg. 27,674 (1986); 52 Fed. Reg. 9042 (1987); 53 Fed. Reg. 5166 (1988); 53 Fed. Reg. 9769 (1988); 59 Fed. Reg. 14,262 (1994). Because petroleum products are not defined as a hazardous substance under CERCLA, OPA requires its own NRDA regulations to cover oil spills. 33 U.S.C. § 2706. CERCLA requires that the Department of the Interior promulgate NRDA regulations, while a 1991 executive order assigned the responsibility of promulgating damage assessment and liability regulations for damages from oil spills to the National Oceanic and Atmospheric Administration ("NOAA"). See *U.S. President Signs Long-Awaited OPA 90 Executive Order*, OIL SPILL INTELLIGENCE REP., Oct. 24, 1991, at 3, 4. DOI and NOAA rulemaking are expected to develop in parallel. Natural Resource Damage Assessments, 59 Fed. Reg. 52,749, 52,749 (1994) (to be codified at 43 C.F.R. pt. 11) (proposed Oct. 19, 1994). For more statutory information regarding NRDA, see David Hodas, *Natural Resource Damages: A Research Guide*, 9 PACE ENVTL L. REV. 107 (1991).

resource trustees may use the assessments when suing for damages and compensation from liable parties.³⁷

Under CERCLA and the NRDA regulations, “[d]amages may be recovered for those natural resources injuries that are not fully remedied by response actions as well as public economic values lost from the date of the discharge or release until the resources have fully recovered.”³⁸ All sums recovered as compensation for natural resource injuries are for “use only to restore, replace, or acquire the equivalent” of the injured natural resources.³⁹ However, CERCLA explicitly states that the measure of damages “shall not be limited by the sums which can be used to restore or replace such resources.”⁴⁰ Therefore, CERCLA allows for compensation in excess of actual damages.

B. *The Administrative and Technical Procedures for Natural Resource Damage Assessment*

DOI's NRDA rules establish administrative and technical procedures for assessing natural resource damages caused by the release of hazardous wastes.⁴¹ These natural resource damage regulations provide an administrative process for conducting damage assessments which consists of four phases: (1) the Preassessment phase, (2) the Assessment Plan phase, (3) the Assessment phase, and (4) the Post-assessment phase.⁴² As required by CERCLA the regulations also provide two types of technical assessment procedures. “Type A” procedures are “standard procedures for simplified assessments requiring minimal field observation.”⁴³ “Type B” procedures are site-specific procedures for conducting detailed assessments in individual cases.⁴⁴

37. 42 U.S.C. § 9607(f); *see also* 33 U.S.C. § 1321(f). The authority to sue for natural resource damages was extended to Indian and foreign trustees under OPA. 33 U.S.C. § 2706(a). *See also* 59 Fed. Reg. 52,749, 52,749 (1994).

38. 59 Fed. Reg. 52,749, 52,749 (1994); *see* 59 Fed. Reg. 14,262, 14,262 (1994). Had such provisions been applied to the Kepone damages, the \$800,000 spent on response actions would have constituted only the tip of the iceberg of recovery costs.

39. 42 U.S.C. § 9607(f)(1).

40. *Id.*

41. 43 C.F.R. §§ 11.10-93 (1994).

42. 43 C.F.R. § 11.13 (1994); *see* 43 C.F.R. §§ 11.20-35 & 11.90-93 (1994).

43. 42 U.S.C. § 9651 (c)(2)(A). For specific standard procedures, *see* 43 C.F.R. §§ 11.40-41 (1994).

44. 42 U.S.C. § 9651(c)(2)(B). For specific standard procedures, *see* 43 C.F.R. §§

During the Preassessment phase, trustee officials decide whether future assessment actions are warranted after a discharge or release is detected or reported.⁴⁵ During the Assessment Plan phase, the trustees perform "various notification and coordination activities . . . designed to focus and organize the assessment, which helps ensure that only reasonable assessment costs are incurred."⁴⁶ These precautionary procedures provide more validity to the assessment activities in addition to producing more reasonable assessment costs.

During the Assessment phase, trustee officials follow three steps: (1) Injury Determination, (2) Quantification, and (3) Damage Determination.⁴⁷ If the trustee officials determine natural resources have been injured, and a pathway of exposure exists between the site of discharge and the injured resource, the trustee officials will then quantify the extent of resource injuries by measuring the reduction from baseline conditions.⁴⁸ Baseline conditions are the "conditions that would have existed at the assessment area had the discharge of oil or release of the hazardous substance under investigation not occurred."⁴⁹ The reduction in baseline conditions should reflect "the loss of services that the injured resource would have provided had the discharge or release not occurred."⁵⁰

The type A and type B procedures are used to determine actual injuries and damages during the Assessment phase.⁵¹ A type A procedure is a standardized procedure involving minimal field work. The only type A procedure that has been published to date is the Natural Resource Damage Assessment Model for

11.60-.84 (1994).

45. 43 C.F.R. §§ 11.13(b), 11.20-25 (1994). The regulations provide a number of criteria to assist trustee officials in making this decision. *Id.*

46. 59 Fed. Reg. 52,749, 52,750 (1994); *see* 43 C.F.R. §§ 11.13(c), 11.30-35 (1994). During the Assessment Plan Phase, the trustee officials also prepare a written Assessment Plan describing the procedures that will be used to determine injury and damages. 59 Fed. Reg. 52,749, 52,750.

47. 43 C.F.R. §§ 11.13(e)(1)-(3), 11.40-.84 (1994).

48. 43 C.F.R. § 11.13(e)(1)-(2) (1994); 59 Fed. Reg. 52,749, 52,750 (1994); *see also* 43 C.F.R. §§ 11.61-.64 (1994).

49. 43 C.F.R. § 11.14(e) (1994); *see also* 59 Fed. Reg. 52,749, 52,750 (1994) ("Reductions from baseline conditions can be measured by evaluating the change in the level of services provided by the injured resources.").

50. 43 C.F.R. § 11.13(e)(2) (1994).

51. 43 C.F.R. §§ 11.40-.84 (1994); 59 Fed. Reg. 52,749 52,750-51 (1994).

Coastal and Marine Environments, which uses a computer model to perform Injury Determination, Quantification, and Damage Determination for minor discharges or releases only in coastal or marine environments.⁵² DOI is currently developing another type A computer model for use in the Great Lakes environment.⁵³

Type B procedures involve site-specific studies. The regulations divide natural resources into five categories: surface water resources, ground water resources, air resources, geologic resources, and biological resources.⁵⁴ The regulations also provide specific definitions of injury for each category along with guidance on testing, sampling, and measuring methodologies used to determine whether an injury has occurred, whether a pathway of exposure exists, and whether a change in baseline conditions exists.⁵⁵ When type B procedures are used, trustee officials must "identify and consider a reasonable number of possible alternatives for restoring, rehabilitating, replacing, and/or acquiring the equivalent of the injured resources."⁵⁶ The trustees' decisions are then documented in a Restoration and Compensation Determination Plan which is subject to public review and comment.⁵⁷

During the final stage, known as Damage Determination, trustee officials calculate the monetary value of the damaged natural resources.⁵⁸ The primary measure of damages is the cost of "restoration, rehabilitation, replacement, and/or acquisition of the equivalent of the injured natural resources and the services those resources provide."⁵⁹ Trustees may also incorporate "compensable value" or "interim" damages, which include the economic value of the services lost by the public from the

52. 43 C.F.R. § 11.41 (1994). The final rule was published on March 20, 1987. See 52 Fed. Reg. 9042 (1987). DOI proposed to revise this Model in 1994 to incorporate a new computer model. 59 Fed. Reg. 63,300 (1994) (proposed Dec. 8, 1994). The comment period has been extended to July 6, 1995. 60 Fed. Reg. 7155 (1994).

53. Natural Resource Damage Assessments: Type A Procedure for Great Lakes Environment, 59 Fed. Reg. 40,319 (1994) (to be codified at 43 C.F.R. pt. 11) (proposed Aug. 8, 1994); see *infra* notes 122-24 and accompanying text.

54. 43 C.F.R. § 11.62(a)-(f) (1994).

55. 43 C.F.R. §§ 11.62-73 (1994); 59 Fed. Reg. 52,749, 52,751 (1994).

56. 59 Fed. Reg. 52,749, 52,751 (1994); see 43 C.F.R. § 11.82 (1994).

57. 43 C.F.R. § 11.81 (1994); 59 Fed. Reg. 52,749, 52,751.

58. See 43 C.F.R. §§ 11.80-.84 (1994).

59. 43 C.F.R. § 11.80(b) (1994).

date of the discharge until the resources are restored, rehabilitated, replaced, and/or acquisition of the equivalent of the resources and their services to baseline.⁶⁰

C. *Assessments Performed in Accordance with the Regulations Receive a Rebuttable Presumption in Court*

While the assessment procedures are not mandatory, they must be used in accordance with CERCLA and OPA regulations in order to receive a rebuttable presumption of accuracy in judicial proceedings.⁶¹ In other words, if the trustee follows the procedures outlined in the rules, the burden of persuasion is shifted to the potentially responsible parties for showing errors or unreliability in assessment and valuation methods. The rebuttable presumption makes damage recovery less difficult and environmental protection more easily attained.

D. *State Law and Legislation—NRDA for Oil Spill Liability*

Under state law, the parties responsible for oil spills and hazardous waste contamination have long been liable for environmental damages. Today, many of the states have enacted their own rules and regulations for assessing natural resource damages. For example, Florida's Department of Natural Resources has developed a "compensation schedule" for assessing damage to natural resources caused by oil spills.⁶² Under Florida's formula, environmental damages are calculated based on several key factors such as the amount and type of oil spilled, the types and extent of habitat directly affected, the proximity of endangered species, and the nearness to the shore.⁶³ Because Florida's plan is intended to be non-penalizing

60. 43 C.F.R. § 11.80(b) (1994). Total compensable value includes both use and nonuse values.

61. 42 U.S.C. § 9607(f)(2)(C); 43 C.F.R. §§ 11.10, 11.91(c) (1994). DOI's regulations may be used to obtain a rebuttable presumption for natural resource damage assessments under OPA until NOAA promulgates its own regulations. 59 Fed. Reg. 52,749, 52,749 (1994) (citing Senate committee language, S. REP. NO. 101-94, 101st Cong., 1st Sess. 15 (1990) (comments regarding judicial review of the rebuttable presumption were accepted until January 17, 1995).

62. FLA. STAT. ANN. § 376.121 (West 1995).

63. *Id.*

and able to withstand courtroom judgments,⁶⁴ it should save money in legal costs and therefore allow damage compensation to be applied entirely to environmental remediation.⁶⁵

Washington State has also created a compensation table under which oil spillers will be liable for penalties of \$1 to \$50 per gallon spilled.⁶⁶ Pursuant to state regulations, the table will be used if: "(a) restoration or enhancement of the injured resources is not technically feasible; (b) damages are not quantifiable at a reasonable cost; and (c) the restoration and enhancement projects or studies proposed by the liable parties are insufficient to adequately compensate the people of the state for damages."⁶⁷

In California, a \$100 million trust fund has been established to provide for quick cleanup, damage assessment, and wildlife rehabilitation after a major oil spill when no responsible party is immediately identified or available.⁶⁸ Scientists from California's Oil Spill Prevention and Response agency will assess natural resource damages, including the loss of "use or

64. See *id.* § 376.121(12) (West 1995) (creating a rebuttable presumption on behalf of the Department in any administrative or judicial proceeding if the assessment is performed in accordance with the rules).

65. See Alane Fitzgerald, *Florida Creates Formula for Damage Assessment*, OFFSHORE, Dec. 1991, at 22, 22.

66. WASH. REV. CODE ANN. § 90.48.366 (West 1992). The Washington regulations also "calculate natural resource damages based on the amount of oil spilled, toxicity, various environmental sensitivity factors and actions taken by the spiller." *Rules for Assessing Damages from Oil Spills Proposed by the Washington State Department of Ecology*, P.R. Newswire, Nov. 26, 1991, available in LEXIS, Nexis Library, P.R. Newswire File. "As oil becomes more toxic and environmental sensitivity increases, the dollar per gallon assessment also increases." *Id.* See also *Washington: The Department of Ecology (DOE) has Proposed Rules for Assessing Damages from Oil Spills*, ST. ENV'T REP., Dec. 11, 1991. The new rules "would provide an alternative to the field studies normally performed for assessments." *Id.* A Resource Damage Assessment Committee (RDAC) comprised of state, federal, tribal and other natural resource trustees will assess natural resource damages. WASH. REV. CODE ANN. § 90.48.368(2) (West 1992).

67. WASH. CODE ANN. § 90.48.367(2) (West 1992). Once collected, damages will be deposited into the Coastal Protection Fund to be spent for future restoration and enhancement activities. *Id.* § 90.48.367(5).

68. CAL. GOV'T CODE §§ 8670.46-53 (West 1992 & Cum. Supp. 1995). The trust fund will be financed in part by a one-time \$.25 per barrel fee on petroleum delivered into or sent out of the state by pipeline, barge, or vessel. *Id.* §§ 8670.47.5-48. See also *State Office Will Administer \$100 Million Oil Spill Fund*, P.R. Newswire, May 13, 1991, available in LEXIS, Nexis Library, P.R. Newswire File.

enjoyment," which are the "passive" uses of natural resources.⁶⁹

In Louisiana, a comprehensive state Oil Spill Prevention and Response Act complements the federal Act, but adds original language aimed at avoiding jurisdictional disputes during a spill response.⁷⁰ The Louisiana Act creates a statewide oil spill contingency plan, which includes procedures for assessing damages to natural resources and a \$15 million Oil Spill Contingency Fund.⁷¹ The Act also limits liability for vessels and facilities based on size and location.⁷²

In August 1994, Texas also revised its NRDA rules for assessing oil spill damages to natural resources in coastal waters.⁷³ Unlike the federal NRDA regulations, the Texas rules allow natural resource trustees to invite the public to take part in determining whether an assessment is necessary and whether the rules require mediation of a disputed NRDA claim before any court is involved.⁷⁴ NRDA liability caps may be invoked depending on a facility's oil handling capacity, but the caps offer no protection when spills are the result of gross negligence, willful misconduct, or a violation of state or federal safety regulations.⁷⁵ Similar to federal law, the Texas rules describe the scientific and economic methods which trustees may

69. CAL. GOV'T CODE § 8670.56.5(7) (West 1992 & Cum. Supp. 1995).

70. LA REV. STAT. ANN., § 30:2451-2496 (West Supp. 1995). See also *Louisiana's Legislature Passes a Spill Bill in Seven-Day Special Session*, OIL SPILL U.S. LAW REP., May 1991 available in LEXIS, Nexis Library, ZLW1 File (explaining the new Act). The emphasis on jurisdictional boundaries is one of the Act's main attractions. James Hanifen, project coordinator for the Department of Wildlife and Fisheries, points out that the jurisdictional delineations are important, because "[t]hat was one of the first things I noticed upon my visit to *Valdez* during the response to the Exxon *Valdez* spill. It was never clear who was supposed to be in charge of what." *Id.*

71. LA. REV. STAT. ANN., §§ 30:2483-2490 (West Supp. 1995).

72. *Id.* § 30:2479.

73. TEXAS NAT. RES. CODE ANN. § 40.107 (West Cum. Supp. 1995); see also *Texas Proposes New NRDA Rules*, E & P ENV'T, Sept. 2, 1994. The proposed rules contain explicit instructions regarding the NRDA process that trustees must follow and the rules establish three types of assessments, expedited, comprehensive, and negotiated, which are used according to the size of the spill. TEXAS NAT. RES. CODE ANN. § 40.107(c)(7)(A) (West Cum. Supp. 1995). The proposed rules do not apply to inland oil spills or to hazardous substance spills which are covered by the federal OPA and CERCLA. See *Texas Proposes New NRDA Rules*, supra.

74. TEXAS NAT. RES. CODE ANN. § 40.107(c)(7)(F) (West Cum. Supp. 1995).

75. *Id.* § 40.203. Therefore, under the Texas plan, the caps would not apply in a case like the Exxon *Valdez*.

use to determine natural resource damages and such damages may include "passive use" values.⁷⁶

As these state NRDA rules demonstrate, assessing natural resource damages under state law has become more regulated, and frequently more expensive.⁷⁷ However, because certain states' regulations provide an alternative approach to traditional field studies, the process for assessing environmental damages from oil spills has been improved.⁷⁸ Moreover, because the state provisions generally complement the federal regulations, natural resource damage assessment has become easier to administer nationwide.

E. Ohio v. Department of the Interior: *Judicial Acceptance of Passive-Use Values*

The federal natural resource damage assessment techniques previously discussed were proposed in 1991.⁷⁹ DOI's former damage assessment techniques, which focused on the economic costs of environmental damage from toxic spills, came under attack from several states, three environmental organizations, and certain industry organizations in 1989.⁸⁰ The environmentalists charged that economic calculations invariably short-changed the environment because market-based valuation alone does "not take into account the long-term, intangible losses

76. *Id.* § 40.107(4).

77. The Washington Department of Ecology points out that "[t]he cost of conducting these natural resource damage assessment studies frequently exceeded the actual value of the lost or damaged resources." *Rules for Assessing Damages from Oil Spills Proposed by the Washington State Department of Ecology*, P.R. Newswire, Nov. 26, 1991, available in LEXIS, Nexis Library, P.R. Newswire File.

78. *See, e.g.*, TEXAS NAT. RES. CODE ANN. § 40.107(a)(3).

79. *See supra* part III.

80. *See Ohio v. Dep't of the Interior*, 880 F.2d 432 (D.C. Cir. 1989). Petitioners included the National Wildlife Foundation and the Chemical Manufacturers Association.

from a disaster like the *Exxon Valdez*.⁸¹ Therefore, they argued, companies like Exxon would get off too easily.⁸²

In *Ohio v. Department of the Interior*,⁸³ environmental groups challenged the regulations, insisting that CERCLA requires damages to be sufficient to pay for restoring, replacing or acquiring the equivalent of the damaged resource in every case.⁸⁴ Existing regulations had required government agencies to assess the "lesser of" restoration costs or lost use values (without restoration) when calculating natural resource damages.⁸⁵ The environmentalists argued that because lost use values are lower than the cost of restoration in most cases, damage awards determined pursuant to DOI's old rule are generally too small to pay for the costs of restoration.⁸⁶ The groups also claimed that the rules relied too heavily on the market prices of natural resources, thus failing to give enough weight to the long-term benefits of unspoiled wilderness.⁸⁷

Several industry groups also challenged the regulations, claiming that the regulations would lead to overstated damages.⁸⁸ DOI defended its rules, arguing that "CERCLA does not prescribe any floor for damages but instead leaves to Interior the decision of what the measure of damages will be."⁸⁹ Although recovered damages must be spent on restoration, DOI asserted that "the amount recovered from the responsible parties need not be sufficient to complete the job."⁹⁰

81. John Lancaster, *Method for Assessing Oil-Spill Damages Hit; Environmentalists Fault Interior*, THE WASH. POST, June 26, 1989, at A1-A5. More than 60 members of Congress and major environmental groups had called on the Bush administration to seek a harsher remedy by a court. *Id.* at A5. "A jury can better assess the enormity of that damage than by attempting to use an adding machine and a pile of reimbursement receipts," said Rep. Robert G. Torricelli of New Jersey. *Id.*

82. *Id.*

83. 880 F.2d at 432.

84. *Id.*; see also *supra* part III(A) (discussing CERCLA requirements).

85. The original type B rule also allowed for the assessment of lost nonuse values only if trustee officials could not establish any lost use values. 59 Fed. Reg. 23,098, 23,100 (1994).

86. *U.S. Appeals Court Shoots Down Interior on Environment Damage Assessments Rules*, PLATT'S OILGRAM NEWS, July 17, 1989, at 3 [hereinafter *U.S. Appeals Court*].

87. Lancaster, *supra* note 81 at A5.

88. *Ohio*, 880 F.2d at 477-78.

89. *Id.* at 442.

90. *Id.*

In *Ohio*, the United States Court of Appeals for the District of Columbia ruled in favor of the environmentalists by invalidating key provisions within the NRDA regulations.⁹¹ The court found that the existing rules ran contrary to Superfund law and congressional intent because Congress had demonstrated "a distinct preference for using restoration costs as the measure of damages, [which] precludes a 'lesser of' rule which totally ignores that preference."⁹² Therefore, the court ordered DOI to revise those regulations to establish the primacy of restoration costs over lost use values and to include the loss of passive-use values to the extent that they could be reliably calculated.⁹³

According to the court, the legislative language made it "logical to presume that Congress intended responsible parties to be liable for damages in an amount sufficient to accomplish its restorative aims."⁹⁴ However, the court determined that DOI's rule "assumes that Congress purposely formulated a statutory scheme that would doom to failure its goals of restoration in a

91. *Id.*

92. *Id.* at 444. The court supported this conclusion by noting that "a distinct preference for restoration costs as the measure of damages is contained in § 107(f)(1) of CERCLA." *Id.* The court determined that the prior regulations "improperly established a strong presumption in favor of market value of lost resources instead of restoration costs as a measure of damages." *Interior Bows to Court Order Nixing Key Points of Spill Damage Assessment*, PLATT'S OILGRAM NEWS, Aug. 11, 1989, at 3.

93. 880 F.2d at 464. The *Ohio* court established the primacy of restoration costs over lost use values, unless those costs are grossly disproportionate in relation to the use value of a damaged resource. Critics have complained, however, that none of the legislation or newly proposed regulations deal effectively with what constitutes restoration or grossly disproportionate costs and that an accurate cost-effective analysis is not possible if restoration remains undefined. Emery N. Castle et al., *Natural Resource Damage Assessment: Speculations About a Missing Perspective*, 70 LAND ECON. 378, 379-80 (1994). "As it stands, the CERCLA damage assessment process does not provide [enough] guidance for compiling the needed ecological information, or for determining appropriate restorative actions." *Id.* at 380.

94. 880 F.2d at 445.

majority of cases.”⁹⁵ Therefore, the “‘lesser of rule’ [was] directly contrary to the express intent of Congress.”⁹⁶

The court also overturned the Hierarchy of Assessment Method and remanded the Public Ownership Rule for further clarification.⁹⁷ The Hierarchy of Assessment Method “establish[es] a rigid hierarchy of permissible methods for determining ‘use values,’ limiting recovery to the price commanded by the resource on the open market, unless the trustee finds that the ‘market for the resource is not reasonably competitive.’”⁹⁸ The court said that market value can serve as one factor to be considered, but that “it is unreasonable to view market price as the *exclusive* factor, or even the predominant one.”⁹⁹ In discussing the Hierarchy of Assessment Method, the court pointed out that “[f]rom the bald eagle to the blue whale and snail darter, natural resources have values that aren’t fully captured by the market system.”¹⁰⁰

The court upheld many other provisions in the regulations. First, the “committed use” requirement, which limits trustees to considering only “committed” public uses when ascertaining the “uses made of a resource,” was upheld.¹⁰¹ The court said that

95. *Id.* The court cited a hypothetical example to illustrate its point: [I]magine a hazardous substance spill that kills a rookery of fur seals and destroys a habitat for seabirds at a sealife reserve. [Under DOI’s rule] [t]he lost use value of the seals and seabird habitat would be measured by the market value of the fur seals’ pelts (which would be approximately \$15 each) plus the selling price per acre of land comparable in value to that on which the spoiled bird habitat was located. Even if, as likely, that use value turns out to be far less than the cost of restoring the rookery and seabird habitat, it would nonetheless be the only measure of damages eligible for the presumption of recoverability under the Interior rule.

Id. at 442 (footnotes omitted).

96. *Id.*

97. *Id.* at 454-64. The Public Ownership Rules were challenged for limiting the “availability of natural resource damages to cases where the resources harmed . . . [were] owned by federal, state, local or foreign governments, rather than private parties.” *Id.* at 459. The court remanded the record to DOI to clarify whether its own regulations applied to lands not *owned* by the government. *Id.* at 461.

98. *Id.* at 462 (citing 43 C.F.R. § 11.83(c)(1) (1994)).

99. *Id.*

100. *Id.* at 462-63.

101. *Id.* at 461. A committed use is a “current public use; or a planned public use of a natural resource . . . established before a discharge of oil or hazardous substance is detected.” *Id.* (citing 43 C.F.R. § 11.14(h) (1994)).

it is an "eminently reasonable construction of the statute [CERCLA], because it avoids the need for unreliable, and likely self-serving, speculation regarding future possible uses."¹⁰² Secondly, The "10% Discount Rate," a procedure used to calculate the present value of an expected future injury, was upheld.¹⁰³ Although the court acknowledged that "the proper discount rate is always a matter of uncertainty," it deferred to DOI's choice of ten percent.¹⁰⁴ Third, the regulation allowing potentially responsible parties to conduct natural resource damage assessments if authorized by a government official was also upheld.¹⁰⁵ Fourth, limits on the liability of responsible parties for the reasonable costs of assessing damages were upheld as well,¹⁰⁶ because the regulations merely limit "the definition of 'reasonable costs' to situations where the 'anticipated cost of the assessment is expected to be less than the anticipated damage amount."¹⁰⁷ The court stated that "[t]he idea behind Interior's regulation was that it is wasteful to devote more resources to a damage assessment than can be recovered by the trustee for the loss of the resource itself."¹⁰⁸

The court also accepted regulations establishing an "acceptance criteria" as a framework for determining whether a hazardous substance release actually caused injury to a particular biological resource.¹⁰⁹ And although CERCLA does not clearly preclude recovery of punitive damages, the court found no fault with the lack of provisions providing for the recovery of puni-

102. *Id.* at 462.

103. *Id.* at 464-65.

104. *Id.* at 465 & n.46. The ten percent discount rate was adopted from the Office of Management and Budget Circular A, dated March 27, 1972. OMB's current circular reports the discount rate at seven percent. DOI solicited comment on setting the discount rate in a recent notice of proposed rulemaking. 59 Fed. Reg. 52,749, 53,755 (1994).

105. *Id.* at 466. The applicable regulation is codified at 43 C.F.R. § 11.32(d) (1994). The court stated that notification of potentially responsible parties during all stages of the assessment process, while the public is denied the same, is not unreasonable "[g]iven that the public is notified and its comments are heard once an assessment plan is drafted." *Id.* at 468.

106. *Id.* at 468.

107. *Id.* (citing 43 C.F.R. § 11.14(ee) (1994)). "CERCLA imposes liability on responsible parties for . . . [the] 'reasonable costs of assessing' natural resource damages." 42 U.S.C. § 9607(a)(C).

108. 880 F.2d at 468.

109. *Id.* at 468-73.

tive damages.¹¹⁰ Lastly, the court accepted the use of "contingent valuation," a controversial procedure used to assess the value of resources that are "non-marketed."¹¹¹

In a separate, but related decision, the court of appeals also held that DOI's type A regulations providing simplified procedures for assessing natural resource damages in a limited class of cases are reasonable in the face of ambiguous statutory language and technical uncertainties.¹¹² However, the type A rules were remanded to DOI to allow it to develop standard procedures for simplified assessments consistent with the *Ohio* decision.¹¹³

F. *Damage Assessment After Ohio v. Department of the Interior*

In response to the *Ohio* decision, DOI revised the NRDA regulations to dispose of the "lesser of" rule, include all use values in the assessment of total compensable natural resource damages, and establish restoration costs as the fundamental measure of natural resource damages.¹¹⁴ The new rules force responsible parties to pay for the restoration or replacement costs of damaged natural resources instead of simply the lost use economic costs. Therefore, under the new NRDA regulations, the parties responsible for damaged resources must now pay for both corollary economic losses and cleanup costs under CERCLA.¹¹⁵ This may largely increase the Superfund liability of responsible parties at many sites.¹¹⁶

110. *Id.* at 474.

111. *Id.* at 479-80. See *infra* part IV.A. for more on contingent valuation. The Chemical Manufacturers Association (CMA) and other industry groups challenged the contingent valuation method. *The Cleanup Bill Rises*, CHEMICAL WEEK, July 26, 1989, at 16. According to Barbara Hinden of CMA, "We felt it was too speculative to use that approach and could reflect the bias of the trustees making the decision." *Id.* at 17.

112. *Colorado v. Dep't of the Interior*, 880 F.2d 481, 487, 489 (D.C. Cir. 1989).

113. *Id.* at 491.

114. 59 Fed. Reg. 14,262 (1994); 59 Fed. Reg. 52,749 (1994). Now trustee officials may recover all restoration costs in *all* cases.

115. 59 Fed. Reg. 14,262 (1994).

116. See *PRP's May Have to Restore Nature*, SUPERFUND, May 17, 1991.

Under the new rules, natural resource trustees are also given greater administrative discretion regarding restoration costs.¹¹⁷ While the rules identify the factors to be considered in determining the alternatives for restoration, rehabilitation, replacement, and acquisition of equivalent resources, trustee officials determine the relative weight of the factors.¹¹⁸ Industry representatives and environmental groups believe that this could lead to much higher cleanup costs than had been expected.¹¹⁹ However, because the *Ohio* court determined that Congress had intended for polluters to pay for the full restoration of damaged resources,¹²⁰ the trustees' discretion is a necessary part of NRDA, as it allows trustees to use the best available methods, of valuation.

The Department of the Interior must review and revise the NRDA regulations biennially.¹²¹ Therefore, changes such as the addition of type A assessment procedures and revisions to passive-use determinations must be considered regularly. For

117. 59 Fed. Reg. 14,262, 14,264, 14,285-86 (1994).

118. 43 C.F.R. § 11.82 (1994). See Castle et al., *supra* note 93, at 378, for a list of factors to consider, including:

- (1) technical feasibility; (2) the relationship of expected costs of the proposed action to the expected benefits; (3) cost effectiveness; (4) the results of any actual response actions; (5) potential for any additional injury; (6) the natural recovery period; (7) ability of the resource to recover; (8) acquisition of equivalent land for federal management where restoration, rehabilitation, and/or other replacement is not possible; (9) potential effect of the action on human health and safety; and (10) consistency with applicable federal state laws and policies.

Id. at 379.

119. *The Cleanup Bill Rises*, *supra* note 111, at 17. The *Ohio* decision "raises the possibility of a higher level of damages to be paid by all potentially responsible parties at Superfund sites." *Id.* (quoting Barbara Hinder, Chemical Manufacturers Association general counsel). Oil industry representatives also assert that tanker liability under OPA may be too costly. Although the Act sets limits on damages, "some experts say that there are so many exception clauses that no tanker operator can envision an accident where such limits would apply," and therefore, "it may be too costly to enter U.S. waters." Marguerite Holloway, *Soiled Shores; Prince William Sound Oil Spill, 1989; Trends in Environmental Technology*, 265 SCI. AM. 102 (1991). American marine insurers have also said that the proposed OPA NRDA regulations will effectively "rid from U.S. waters all forms of watercraft, commercial as well as private." Gerald Karey, *Regulation and The Environment*, PLATT'S OILGRAM NEWS, Nov. 14, 1994, at 3 (comments on the proposed NOAA NRDA rules).

120. *Ohio*, 880 F.2d at 439, 444.

121. 42 U.S.C. § 9651(c)(3). DOI initiated a biennial review of the NRDA regulations in October 1994. 59 Fed. Reg. 52,749 (1994) (comments were accepted through Jan. 17, 1995).

example, in 1994, DOI issued a notice of proposed rulemaking to revise the NRDA regulations by adding an additional type A procedure for assessing natural resource damages in Great Lakes environments.¹²² The additional type A procedure divides the Great Lakes area into a series of rectangular grids and assigns a habitat type to each cell within the grids.¹²³ Under the proposed rule, trustee officials cannot modify the habitat designations in the final version of the model if they wish to obtain a rebuttable presumption for their assessments.¹²⁴

The National Oceanic & Atmospheric Administration (NOAA) is expected to issue its own rules in early 1995.¹²⁵ The procedures will include a computer model for assessing natural resource damages based on information about the amount of oil spilled, the location of the spill, the movement of spilled oil, and the mortality rates of fish and waterfowl.¹²⁶ The model will take into account passive-use values such as losses suffered by people who don't actually use the injured resource as well as restoration costs.¹²⁷ Some economic analysts contend that this model will greatly overstate estimates of natural resource damages,¹²⁸ however, the new rules will be in keeping with congressional intent, as revealed in the *Ohio* decision.

122. 59 Fed. Reg. 40,319 (1994) (to be codified at 43 C.F.R. pt. 11) (proposed Aug. 8, 1994). The rulemaking incorporates a computer model called the Natural Resource Damage Assessment Model for Great Lakes Environments Version 1.31. On November 2, 1994, the Department extended the period for comment through February 6, 1995, and solicited comment on an additional aspect of the type A procedure. 59 Fed. Reg. 54,877 (1994) (to be codified at 43 C.F.R. pt. 11) (proposed Nov. 2, 1994).

123. 59 Fed. Reg. 40,319.

124. 59 Fed. Reg. 54,877. DOI solicited comments until February 6, 1995, on whether to revise the rule to allow trustee officials to modify the habitat designations in the final version and still obtain a rebuttable presumption. *Id.*

125. Karey, *supra* note 119, at 3. It is expected that the OPA rules will run parallel to the CERCLA regulations for natural resources damage assessment. 59 Fed. Reg. 14,262, 14,262 (1994).

126. Karey, *supra* note 119, at 3. Some state regulations provide for similar assessment considerations. *See e.g.*, TEXAS NAT. RES. CODE ANN. § 40.107 (West Cum. Supp. 1995).

127. Karey, *supra* note 119, at 3.

128. *Id.* Economic Analysts, Inc., which was hired by the Water Quality Insurance Syndicate (a pool of marine insurers that insures liabilities from oil and hazardous substances pollution) believes that the computer simulated spills produce damage estimates larger than those actually occurring for much larger spills. *Id.* at 2.

IV. CAN THERE BE ACCURATE ENVIRONMENTAL DAMAGE ASSESSMENT?

"The fundamental problem of damage valuation for the per se loss of wildlife is that the intrinsic worth of natural resources does not conveniently fit the terms of economic accountability."¹²⁹

Although we can easily discuss and see the effects of environmental damage, calculating such damage is not an easy task. While some environmental resources already have established market values, many others are not so readily defined. Even though the regulations tell us how to assess damages, it remains to be seen whether we can accurately put a monetary value on the environment. Even if a resource has a market value, that market value may not constitute its only "real" value. In order to maintain a clean environment, however, we must assign monetary values because monetary penalties may be used to remedy environmental damage and deter subsequent environmentally unsound behavior.

The immediate damage to Alaska's environment following the Exxon Valdez spill was unequivocally significant. At least 400,000 birds and a third of the area's sea otters were destroyed, the most killed by any oil spill in history.¹³⁰ But what is a bird really worth? In the past, the federal government assessed damages by assigning market values to dead wildlife and injured natural resources, such as \$15 for a fur seal or \$35.74 for a Canada goose.¹³¹ But the *Ohio* court determined that market valuation methods alone do not adequately compensate the public, and therefore ordered DOI to revise the rules so that natural resource trustees would give more weight

129. ZYGMUNT J.B. PLATER ET AL., ENVIRONMENTAL LAW AND POLICY: NATURE, LAW, AND SOCIETY 168 (1992).

130. Lauren Neergaard, *Exxon Challenges Damage Claims*, ANCHORAGE DAILY NEWS, Apr. 15, 1993, at B1. Government scientists estimate that 10 percent of the common murrees in the Gulf of Alaska region were killed; about one-fifth of the sea-otter population was killed; and 153 bald eagle carcasses were found. Bill Dietrich, *Alaska: Surviving the Spill—The Impact on Wildlife Still Uncertain*, SEATTLE TIMES, Mar. 25, 1991, at A1, A5.

131. John Lancaster, *Value of Intangible Losses from Exxon Valdez Spill Put at \$3 Billion*, THE WASH. POST, Mar. 20, 1991, at A4. The price for a Canada goose has been "derived from analyzing their popularity among hunters." *Id.*

to intangible losses when assessing the cost of natural resource damages.¹³² Therefore, old techniques have been revived and new techniques have been developed to assist scientists, economists, and lawyers assess environmental damage more accurately.

A. *Passive-Use Values and the Contingent Valuation Method*

The concept of "existence" or "passive-use" values was first advanced in 1967.¹³³ Since then the concept of nonuse values has broadened and a variety of environmental assessment methodologies have been proposed. Non-market techniques, such as the travel cost method, the hedonic price method, and the unit day value method, have been developed to determine "shadow prices" for non-market resources.¹³⁴ Shadow prices reflect amounts that resource users would spend to use a particular resource. They are used to calculate the economic value of the present use of a damaged non-market resource.¹³⁵

The contingent valuation method has gained the most support from environmentalists because it directly addresses environmental assets which are not commercially valuable.¹³⁶ The contingent valuation method measures the passive uses of the environment by using public opinion polls in which people are

132. *Ohio v. Dep't of the Interior*, 880 F.2d 432, 476 (D.C. Cir. 1989).

133. *Castle et al.*, *supra* note 93, at 381. Passive-use values also encompass "non-use" values. According to Castle, J. Krutilla first advanced the idea, noting that "people may experience satisfaction from knowing the natural environment is protected from irreversible allocation decisions." *Id.*

134. 43 C.F.R. § 11.83 (1994). See PLATER ET AL., *supra* note 129, at 56-58. A variety of non-market techniques have been suggested for non-market resources, including: (1) the travel cost method, which uses the cost of travel to a recreation site as a surrogate for the price of recreation services; (2) the hedonic price method, which attempts indirectly to find the effect of the resource injury on the price of other resources like land; (3) the unit day value method, which determines the value per day of various recreational activities using a table of values; and (4) the contingent valuation method, which uses a public survey to determine the public's willingness to pay for environmental protection and/or restoration. *Id.*

135. PLATER ET AL., *supra* note 129, at 57.

136. John H. Cushman, Jr., *U.S. Would Temper Oil-Spill Damage Calculation*, N.Y. TIMES, Jan. 8, 1994, § 1 at 9. Environmentalists consider contingent valuation to be an important weapon as they seek compensation from polluters. *Id.* Under the NRDA rule published March 24, 1994 trustee officials may use contingent valuation when estimating lost use values. 43 C.F.R. § 11.83(c)(2)(vii) (1994).

asked how much they would pay to preserve or protect a particular resource.¹³⁷ The dollar amounts are then multiplied by the number of people potentially affected by an oil spill or hazardous waste release.¹³⁸ By assigning economic values to passive uses, the surveys determine what value the public places on preserving wild species or natural resources that are never actually bought or sold. Natural resource trustees can then use the converted passive values in their damage calculations when seeking compensation from parties liable for environmental injuries.

Developed by natural resource economists for DOI,¹³⁹ endorsed by an advisory panel of economists, including two Nobel laureates,¹⁴⁰ and affirmed by the Court of Appeals for the District of Columbia,¹⁴¹ the contingent valuation method is currently the only, and thus the best, method available for estimating nonuse values.¹⁴² According to its supporters, contingent valuation "can produce estimates reliable enough to be a starting point for a judicial process of damage assessment."¹⁴³

137. See Alane Fitzgerald, *Valdez Litigation Will Shape Future Environmental Law, OFFSHORE*, May 1991, at 81, 81.

138. *Id.* Exxon's chief counsel, John Seddelmeyer, opposed the method, explaining that "[s]ince this group, by definition, is not limited to people who actually visit the impacted area or live nearby, it arguably includes all of the people in the United States. . . ." *Id.*

139. *Id.*

140. Panel of NRDA Experts Says CV Studies Are "Reliable Enough," OIL SPILL U.S. LAW REP., Feb. 1993 available in LEXIS, Nexis Library, ZLW1 File [hereinafter Panel of NRDA Experts]. The contingent valuation and damage assessment panel appointed by NOAA acknowledges that contingent valuation has become the subject of "great controversy" in the last five years, but the panel also points out that any method of assessing nonuse values would be controversial. *Id.* The panel suggests that contingent valuation is controversial in part because of the "impossibility of validating externally the results of [contingent valuation] studies." *Id.*

141. *Ohio v. Dep't of the Interior*, 880 F.2d 432 (D.C. Cir. 1989).

142. 59 Fed. Reg. 23,098, 23,100 (1994).

143. Peter Passell, *Economic Watch; Disputed New Role for Polls: Putting a Price Tag on Nature*, N.Y. TIMES, Sept. 6, 1993, at 36; see also Richard C. Bishop and Michael P. Welsh, *Existence Values in Benefit-Cost Analysis and Damage Assessment*, 68 LAND ECON. 405, 405 (1992) (stating that the \$12 million needed to prevent the striped shiner's extinction is a pure existence value); Richard C. Bishop and Kevin J. Boyle, *Valuing Wildlife in Benefit Cost Analysis: A Case Study Involving Endangered Species*, WATER RESOURCES RESEARCH 23:943-50 (1987) (stating that contingent valuation was used to estimate that Wisconsin taxpayers would pay about \$12 million annually to prevent the extinction of the striped shiner in Wisconsin although the striped shiner had no known present or future uses).

Used to calculate the Exxon *Valdez* spill damage at \$3 billion, the method may have helped to convince Exxon to settle at \$1.1 billion before the survey was introduced as evidence.¹⁴⁴ While there was no guarantee that a judge and jury would have relied on the \$3 billion estimate, “[f]ederal officials defended the settlement as a landmark penalty that avoids a costly and uncertain trial while providing immediate cash for cleanup and restoration.”¹⁴⁵

Although contingent valuation has been judicially approved, the appropriate use of the method and the estimation of passive-use values in general have continued to cause debate. Contingent valuation has been criticized by the oil industry and economists accustomed to using market transactions to reveal value.¹⁴⁶ Certain problems are apparent; for example, one critic points out that the “[s]urvey techniques . . . are inherently limited by the fact that the conclusions are based on what people say they would do—not on what they have done.”¹⁴⁷ Additionally, the results of a survey can vary significantly depending on how the questions are worded. Other critics argue that the hypothetical questions may be incorrect because the designers of contingent valuation surveys may not have the biological knowledge necessary to specify the effects of environmental damage.¹⁴⁸

However, according to a report issued by the NOAA panel of experts, “a well-designed [contingent valuation] study will mini-

144. See Lancaster, *supra* note 131, at A4. Economists conducted the confidential studies for the state of Alaska and the federal government by surveying 1,000 households nationwide through face-to-face interviews in which they displayed photos and asked interviewees how much they would pay to protect Prince William Sound. The preliminary results showed a median amount of \$30 per household, which calculates to \$3 billion estimating that there are 100 million households in the U.S. *Id.*

145. *Id.*

146. See Passell, *supra* note 143, at A1.

147. *Id.* (citing more anomalies and problems arising from random surveys). The Ohio court addressed industry's concern with the overstatement of damages when using contingent valuation and stated that an “obvious safeguard against overstatement . . . is more sophisticated questioning.” *Ohio v. Dep't of the Interior*, 880 F.2d 432, 478 (D.C. Cir. 1989).

148. See Castle et al., *supra* note 93, at 379. Emery Castle points out that those who design and administer contingent valuations surveys must carefully consider how much information to provide as context for the hypothetical questions to be asked. Although complex biological considerations are involved, biological scientists and ecologists have been consulted only casually and infrequently. *Id.* at 382-83.

mize many of the problems inherent in the technique."¹⁴⁹ To minimize reliability questions and concerns, the panel has provided a list of guidelines for designing an ideal contingent valuation study.¹⁵⁰ The NOAA panel recommends that contingent valuation survey questions include extensive information and consider "three recovery scenarios: (a) 'immediate' restoration, (b) accelerated restoration, and (c) natural restoration."¹⁵¹ Observers say that the State of Alaska apparently used this method, setting damages as the difference between (a) and (b), based on the assumption that Exxon would provide for the accelerated restoration.¹⁵² For future contingent valuation research, the panel suggests that DOI produce standard damage assessments for a few specific small and large oil spills, either hypothetical or actual, which could then serve as benchmarks for future studies.¹⁵³

The Panel's recommendations appear to be based on an assumption that recovery or restoration will occur.¹⁵⁴ This assumption leaves open, however, the question of whether recovery will be accelerated by human intervention. If the population size of a natural species affected by an oil spill or hazardous waste release will generally return to pre-contamination levels, then passive-use value losses amounting to \$4 billion and lost recreational values equaling \$3.8 million may not seem plausible.¹⁵⁵ The fact that certain natural resources eventually recover on their own provides environmental polluters with an argument against contingent valuation studies and other passive-use damage assessment methodologies.¹⁵⁶

149. *Panel of NRDA Experts, supra* note 140.

150. *See* Castle et al., *supra* note 93, at 379; *Panel of NRDA Experts, supra* note 139.

151. Castle et al., *supra* note 93, at 383.

152. *Id.*

153. *Panel of NRDA Experts, supra* note 140.

154. *See* Castle et al., *supra* note 93, at 383.

155. *Id.*

156. One group of commentators have pointed out that "[t]he estimation of passive-use values by contingent valuation, or other techniques, is unnecessary for effective protection from natural resource damage events." Castle et al., *supra* note 93, at 384. However, environmentalists and the Court of Appeals for the District of Columbia would be sure to disagree. Under a proposed rule published December 8, 1994 a "Restoration Submodel" would not even compute habitat restoration costs if the relevant habitat restoration would result in a higher total injury than reliance upon natural recovery. 59 Fed. Reg. 63,300, 63,310 (1994).

However, contingent valuation and passive-use considerations may be crucial to damage assessments in certain locations. Passive-use values will become more important to less developed areas, as use values alone may not sufficiently justify restorative efforts. Because the Alaskan wilderness affected by the Exxon Valdez spill was largely recreational and non-commercial land and water, passive-use values comprised a large portion of the Exxon Valdez damages.¹⁵⁷

B. *More Problems to Consider When Assessing Natural Resource Damages*

While critics argue that contingent valuation may over-value the environment, a number of variables may counteract any over-valuation. First, environmental damage caused by hazardous waste may linger for decades or mushroom exponentially.¹⁵⁸ Years may pass before scientists accurately assess the overall damage incurred. For example, ten years after the hazardous waste problems at Love Canal were officially recognized, scientists were still assessing the environmental damage in the area.¹⁵⁹ And five years after the Exxon Valdez accident scientists were only beginning to study the spill's long term affects.¹⁶⁰

True cleanup may also prove to be an elusive goal. Twenty years after the Kepone incident, the toxic chemical continues to

157. Castle et al., *supra* note 93, at 379.

158. See generally Richard C. Paddock, *Spill's Effects Could Linger for 50 Years; Environment: The Upper Sacramento River's Aquatic Life May Need 20 Years to Return to Levels of Last July, Before a Train Derailed and Spilled Pesticide, a Study Says*, L.A. TIMES, Oct. 16, 1991, at A3 (explaining how a 1991 toxic pesticide spill in the upper Sacramento River could linger for over fifty years).

159. See Michael H. Brown, *A Toxic Ghost Town: Ten Years Later, Scientists Are Still Assessing the Damage from Love Canal*, THE ATLANTA CONST., July, 1989, at 23. Hooker Chemical and Plastics Corporation had dumped 43.6 million pounds of process slurries, waste solvents, and pesticide residues into an abandoned canal, now known as Love Canal. *Id.* Within 10 years after this toxic-waste dump was discovered, approximately \$150 million had been spent to sample the air, groundwater, and soil, to survey local health problems, to buy residents' homes and move those residents, and to abate and clean up the pollution. *Id.*

160. Natalie Phillips, *Spill's Legacy Lingers, Researchers Say Damage Continues*, ANCHORAGE DAILY NEWS, Mar. 23, 1994, at C1.

contaminate the James River and Chesapeake Bay.¹⁶¹ Six years after the Exxon *Valdez* oil spill, Prince William Sound is still contaminated.¹⁶² While some scientists feel that nature—not Exxon—should be credited for any improvements to the environment, others question whether the cleanup was even worth the cost, both ecologically and financially.¹⁶³

Unfortunately, cleanup efforts themselves may damage the environment. For example, the high-pressure, hot-water blasting treatment used to remove oil washed ashore after the Exxon *Valdez* incident left some areas upstream virtually dead and others downstream fundamentally impaired.¹⁶⁴ Bioremediation and accelerated fertilization, possibly the most natural methods of cleanup, are effective only to the extent that the area involved is responsive to such treatment.¹⁶⁵ Some fertilizers used in Prince William Sound may have even caused algal blooms and injured area mammals.¹⁶⁶ Dispersants used to break up oil slicks into droplets contain highly toxic compounds

161. Springston, *supra* note 13, at A1-A12. Because Kepone tends to remain toxic and not break down, it is "a long-lived environmental threat . . . [that] might remain in the James for hundreds of years." *Id.* at A12.

162. *See id.* The assessor's prejudices will further complicate damage assessment because each assessor may view contamination differently. *See* Dietrich, *supra* note 130, at A5. For example, when Sue Libenson of the Alaska Center for the Environment showed a bag of oily mussels to an oil executive, the executive pointed out that the mussels were still alive. *Id.* Exxon's research shows that damage from the spill lasted only a few months, while the U.S. government's research shows that long-term recovery is far from complete. *Id.*

163. *See* Holloway, *supra* note 119, at 104. John Farrinton, associate director of education for the Woody Hole Oceanographic Institute, asserts that the removal of oil from a marsh in Brittany "destroyed portions of the marsh for much longer than it would have if we had allowed nature to take its course." *Id.* at 106. Alaska's rich environment and powerful storms helped to speed the cleansing process. *See* Dietrich, *supra* note 130, at A5.

164. *See* Holloway, *supra* note 119, at 105. According to one environmental scientist, hot-water and pressurized treatment "kills any animals that are still alive, and it has a tendency to work oil into the sediments further." *Id.* The hot-water washes loosened oil from the upper stretches of beach where oil-tolerant species or few organisms live, which then flowed downstream into the habitats of relatively sensitive organisms. *Id.* The pressure of the hot-water washes also de-stabilizes gravel and sand beaches. *Id.* NOAA studies have shown that in some areas, the hot-water treatment killed more wildlife than if the oil had been left to weather naturally. *See also* Dietrich, *supra* note 130, at A5 (discussing the effects of oil cleanup).

165. *See generally* Holloway, *supra* note 119, at 111 (discussing bioremediation at Prince William Sound).

166. *Id.*

that can destroy certain sealife populations.¹⁶⁷ Another remedial alternative, oil burning, can get rid of most of an oil slick, but it will release heavier, more toxic hydrocarbons into the air than would normally evaporate.¹⁶⁸ Even if they were not damaging, both dispersants and oil burning techniques must be used immediately to be effective. Therefore, any court order or post-damage assessment action would be too late.

Simply researching environmental damage assessment techniques has also caused problems. In August 1994, a ship researching how to contain oil spills accidentally released about 200 gallons of diesel fuel off the coast of the Florida Keys.¹⁶⁹ When state and federal researchers were building evidence against Exxon in their separate lawsuits, they "killed ducks, seabirds, deer, seals, sea lions, and other animals. The 400-plus birds killed by researchers total more than half the number that were found alive after the March 1989 spill, scrubbed clean and released in a \$25 million, Exxon-funded bird rescue effort."¹⁷⁰ Although 36,000 frozen bird carcasses had been recovered and kept as evidence, researchers maintained that "fresh kills" were a required standard procedure.¹⁷¹ State researchers also killed animals to study long-term contamination, which could be more deadly than the initial pollution from the spill.¹⁷²

C. *The Future of Contingent Valuation and Passive-Use Values*

In January 1994, the Clinton Administration "called for a conservative approach to calculating how much compensation

167. For more on dispersants and oil burning, see *id.* at 114.

168. For information regarding testing the effectiveness of oil burning, see *id.*

169. Catherine Wilson, *Research Ship Runs Aground on Coral Reef, Leaks Diesel on Fragile Keys Reef*, SUN SENTINEL, Aug. 12, 1994, at C1. Although the ship was on a mission to research pollution and how to contain oil spills, the Coast Guard planned to unload approximately 45,000 gallons of diesel fuel from the ship itself. *Id.*

170. David Postman, *More Losses in Prince William Sound: Government Kills Wildlife for Evidence; Exxon Valdez Oil Spill Investigation*, THE OIL DAILY, Oct. 30, 1990, at 4 (explaining that "wildlife kills are a standard procedure . . . a standard scientific process.")

171. *Id.* According to federal and state officials working on the spill lawsuit, the Justice Department recommended such research, but the Justice Department has denied any knowledge of the research. *Id.*

172. *Id.*

polluters should pay after oil spills.”¹⁷³ The Administration said that it would rather underestimate environmental damage than overestimate it by relying too heavily on non-market valuation techniques.¹⁷⁴ Therefore, NOAA rules proposed in January 1994 suggested that certain passive-use values be discounted by fifty percent.¹⁷⁵ According to one NOAA official, strict standards were being set in order to make passive-use valuation techniques “litigation-proof.”¹⁷⁶

Continued litigation, however, is inevitable. Although the *Ohio* court upheld the validity of contingent valuation and other social cost studies for valuing environmental catastrophes, questions regarding the reliability of such studies remain.¹⁷⁷ Because a contingent valuation study cannot be specifically validated, the results of a contingent valuation survey might not hold up in court. Despite the rebuttable presumption of accuracy given to damage assessments performed in accordance with the regulations, a jury may still question the results of a contingent valuation study when the defendant’s experts present a significant amount of evidence contrary to the study.¹⁷⁸

Market-based values, such as cleanup costs and measurable financial damages, may be relatively easy to compute, but the question of intangible losses will continue to spark debate. Even as shadow prices, contingent valuation, and other passive-use valuation techniques receive wider acceptance by industry and economists, such techniques, however, will still “omit values of

173. Cushman, *supra* note 136, at 9.

174. *Id.*

175. *Id.* NOAA’s proposed rules would apply only to oil spills, but DOI was expected to adopt the same sort of rules to cover hazardous substances. *Id.*

176. *Id.* (statement by Linda Burlington, NOAA official).

177. See Castle et al., *supra* note 93, at 379 (“[i]t is at once both the ‘least reliable’ method for assessing passive-use values under 1991 DOI proposed rules and the only method for doing so.”). William K. Reilly of the EPA has said that such studies “have their place . . . [but] they’re new, there’s not a lot of litigation, and courts haven’t awarded anything on the basis of how much somebody says they’re willing to pay to save a river otter.” Lancaster, *supra* note 131, at A4.

178. Passell, *supra* note 143, at 36. Although oil industry representatives believe that “the chances of getting hit hard with a damage award for lost passive-use may be low, . . . the sums involved are so large that they are bound to affect commerce.” Industry observers say that the risk of paying exorbitant damage costs might make it impossible for some industries to obtain liability insurance or even to stay in business. *Id.*

great significance," because such pricing methods still focus on quasi-commercial values.¹⁷⁹ However, "both the willingness to pay and willingness to accept contingent valuation data provide evidence that passive-use values do, in fact exist empirically,"¹⁸⁰ and will, in fact, continue to affect natural resource damage assessment.

V. THE EMERGENCE OF LITIGATION-DRIVEN SCIENCE

A. *Key Precedents Set by the Exxon Valdez Litigation*

While the Kepone incident shocked the public, the Exxon Valdez accident forever changed the public's perception of environmental catastrophe and liability. As the largest oil spill in U.S. history, it has become one of the most studied, and possibly the most influential, oil spill in history.¹⁸¹ Because the technology available in 1989 proved unable to contend with the spill, the incident "catalyzed a reevaluation of cleanup technology" and sparked final enactment of the Oil Pollution Act of 1990.¹⁸²

Although Exxon eventually settled with the state of Alaska and the federal government, paying \$1.1 billion in fines in 1991, the spill litigation, cleanup efforts, and scientific research did not end with the settlement. New standards in environmental settlements, natural resource damage assessment, and scientific research emerged from the accident. First, the litigation surrounding the Exxon spill affected the future of natural resource damage assessment by providing a proving ground for

179. PLATER ET AL., *supra* note 129, at 57 (stating that a "technique like the travel cost method . . . produces only a lower bound estimate of the costs involved" when the environment is damaged.) (quoting E. GRAMLICH, A GUIDE TO BENEFIT COST ANALYSIS 136-38 (2d ed. 1990)).

180. Castle et al., *supra* note 93, at 381.

181. See generally Holloway, *supra* note 119, at 104. Large oil spills galvanize public concern, yet the U.S. Coast Guard reports that only five percent of the estimated 2.3 million tons of petroleum hydrocarbons entering the seas each year comes from tanker accidents. *Id.*

182. *Id.* The incident "tore off the veil of preparedness worn by U.S. industry and by federal and local governments." *Id.* at 103. According to Holloway, "the findings of scientists assessing the damage to the Sound and the subsequent recovery of the environment may shape the direction of cleanup and prevention technologies for years to come, both nationally and internationally." *Id.* at 104.

contingent valuation and large settlement negotiations. In fact, the Exxon *Valdez* settlement may have set a standard for future large spill cases. Some industry representatives fear that people will now expect monumental settlements, even where the environmental impact is not severe. Others see the settlement as "a positive step for industry" because "it was within Exxon's ability to pay and was initiated by a governor willing to court the oil and gas business."¹⁸³ As passive-use values play a larger role in natural resource damage assessment and settlement negotiations, the methods used to assess such damages will become more controversial. However, if the public expects exorbitant settlements for hazardous waste discharges and oil spills, damage assessment techniques that include passive-use values may receive less criticism.

By agreeing to a settlement, the parties avoided an exhaustive legal dispute over the non-economic and passive-use environmental damages caused by Exxon's oil. Consequently, the parties deferred questions regarding the contingent valuation method of natural resource damage assessment. Using contingent valuation, the Alaskan and federally funded damage assessment study determined that the actual cost of the *Valdez* spill was well over \$3 billion.¹⁸⁴ Although the contingent valuation method and its validity has been questioned by economists and industry representatives, it represents one of the best available techniques under the regulations,¹⁸⁵ and it would have significant precedential value in future environmental damage suits if accepted in a high profile case like Exxon.

By agreeing to the settlement, the parties also showed that neither side knew how much a judge or jury would award in compensatory damages.¹⁸⁶ While Exxon's experts point out that the recovery from the spill has been dramatic, environmentalists point out that "nearly two-thirds of the 10.8 million-gallon oil spill . . . neither was recovered nor evaporated."¹⁸⁷ Because most of the oil dissipated into the environment, its potential for long-term harmful effects is still in dispute. While

183. Fitzgerald, *supra* note 137, at 81.

184. *See id.*

185. 43 C.F.R. § 11.83(C)(2)(vii) (1994).

186. *See* Dietrich, *supra* note 130, at A1.

187. *Id.*

the injury incurred remains speculative and the experts assessing the damage have arrived at different figures, a jury could have easily arrived at an unexpected or unprecedented damage award.¹⁸⁸

As the environmental damage assessment figures increase, so will settlement awards. And as the settlement awards increase, so too will the industry's scrutiny of damage assessment methodologies. Within one year of the Kepone discovery, only \$800,000 had been spent to assess and cleanup the environmental damage caused by the Kepone release, whereas within one year of the Exxon *Valdez* spill, \$12.3 million had already been spent assessing damage to the Alaska coastline.¹⁸⁹ Over the years, natural resource damage assessment costs have risen greatly and they may continue to rise,¹⁹⁰ reflecting both the concentration of environmental statutes and the public's growing concern for the environment.

188. Today more companies are moving to clean up sites themselves, because "they feel they can control costs better than [a court-] appointed third party." R.J. King, *Hazardous Waste*, THE DETROITER, Mar. 1992 at 12, 15. (A. Barry Seymour, senior vice president of Camp, Dresser & McKee, one of the nation's largest environmental engineering firms.) Therefore, private cleanup efforts have become big business for many companies specializing in hazardous waste cleanups. *See id.* at 12. "With stricter environmental regulations in place, . . . [many companies] have seen sales swell into the millions from revenues in the thousands just 20 years ago." *Id.* Such companies have grown quickly, due largely to recent environmental regulations, "growing consumer expectations fueled by the media and widening recognition among U.S. businesses that environmental action not only makes for sound citizenship but good public relations as well." *Id.* at 13-14. According to the Environmental Business Journal, revenues for environmental services totaled \$132 billion in 1990, and industry revenues are likely to double by the end of the century. *Id.* at 14.

189. After only one year, nine federal agencies had spent \$125.2 million, of which \$111.8 million went for actual cleanup, \$12.3 million for damage assessment, and \$1.1 million for other costs. Nick Snow, *Valdez Clean-up Costs Nine Federal Agencies \$125.2 Million*, THE OIL DAILY, Mar. 15, 1990, at 5, 5. "Four departments (Defense, Transportation, Interior and Commerce) accounted for 94 percent of the total costs. . . ." *Id.* All but one filed requests for reimbursement from the § 311(k) fund established by the Clean Water Act and from Exxon Corp. *Id.*

190. In one case, a consent decree concluding a landmark 12-party agreement on a federal Superfund cleanup in Puget Sound required that a *minimum* of \$1 million be spent on assessing natural resource damages incurred by the Tacoma waterfront, restoring habitat, and rehabilitating the area's aquatic environment. *Ongoing Enforcement Actions*, EPA JOURNAL, July-Aug. 1991, at 6, 6. Routine environmental-compliance costs have risen as well, with large industrial companies now spending as much as \$450 million per year. King, *supra* note 188, at 14.

B. *The Emergence of Litigation-Driven Science*

The Exxon Valdez litigation did more than awaken the public to environmental catastrophe and accident liability. The prominence of lawyers in all post-spill activities influenced subsequent scientific research, environmental cleanup efforts, and natural resource damage assessment.

The emergence of litigation-driven science, coupled with the legal sealing of scientific evidence related to oil spills and chemical releases, has affected scientific research and angered the scientific community.¹⁹¹ Some scientists are concerned that lawyers hinder spill response and scientific advancement because they advise their clients to withhold certain information to protect them from future liability, thereby “polarizing the response.”¹⁹² Within two years of the Exxon oil spill, researchers were claiming that science was playing “less of a role in fostering knowledge and shaping policy about the (Exxon Valdez) spill than it [was] in laying the foundation for . . . epic litigation in damage reimbursement.”¹⁹³ Even the money well spent on determining the spill’s effects was tainted—much of the original scientific funding focused on what would “generate the greatest return in the litigation forum.”¹⁹⁴ One environmental protection officer has gone so far as to suggest that lawyers be kept “out of the process until the players reach a point of non-agreement.”¹⁹⁵ Lawyers have responded to such allegations and suggestions, asserting that their immediate presence is essential because local authorities may upstage and influence an on-scene coordinator by threatening criminal charges.¹⁹⁶

191. Fitzgerald, *supra* note 137, at 82; see *Lawyers and Scientists and Spills . . . Oh My*, OIL SPILL U.S. LAW REP., April, 1991 available in LEXIS, Nexis Library, ZLW1 File [hereinafter *Lawyers and Scientists*].

192. *Lawyers and Scientists*, *supra* note 191 (quoting June Lindstedt—Siva, environmental protection officer for ARCO).

193. *Exxon Valdez: Data from Spill is Held Up by Litigation*, GREENWIRE, Aug. 30, 1991 available in LEXIS, Environment Library, Greenwire File (statement by John Balzar, L.A. Times).

194. Fitzgerald, *supra* note 137, at 82 (statement by Harry Bader of the University of Alaska-Fairbanks). Some commentators have suggested that NRDA studies be separated from scientific studies and response operations in terms of timing, funding, and goals, so that the conclusion of litigation does not mark the conclusion of damage assessment. See *id.* (discussing suggestions of June Lindstedt-Siva).

195. *Lawyers and Scientists*, *supra* note 191.

196. *Id.*

Scientists have also raised concerns regarding the effects of certain legal constraints on post-spill scientific research.¹⁹⁷ Scientific research and findings are traditionally shared and discussed by the entire scientific community, but in a case like the Exxon *Valdez* case, researchers may be forbidden to share their results or even to say what type of research they are performing.¹⁹⁸ Following the Exxon *Valdez* spill, the state of Alaska sealed all of its scientific records indefinitely, while the federal government sealed its findings until the settlement was finalized.¹⁹⁹ The system that seals scientific evidence, however, may be "robbing itself of its own best information,"²⁰⁰ because joint efforts lead to better assessment techniques and more efficient cleanup. The sealing of government evidence and findings may also adversely affect private litigants, the development of fair oil spill law, and consequently, the public trust.²⁰¹ Private litigants unable to conduct their own studies may lose cases when government information is unavailable, and scientists hired by private companies like Exxon will be able to publicize their findings and dominate the damage assessments figures.²⁰²

197. See *id.* James Butler of Harvard University points out some reasons why science and law don't mix:

Lawyers prefer clear positive statements, but most scientific results, particularly in environmental fields, are ambiguous. As a result, lawyers often put pressure on scientists to make conclusions when the scientists do not feel comfortable doing so; the legal staff may take scientific results out of context and over-interpret them, or interpret them to support the case when the results could very likely be interpreted the opposite way; cross-examination is often phrased to make the expert witness appear less expert or less sure of his judgment; and lawyers often interpret data collected by researchers into a view of the problem, but substantial new data can sometimes change this view radically. Thus the interpretation may depend on the time when the question is asked.

Id.

198. Fitzgerald, *supra* note 137, at 82. According to Harry Bader of the University of Alaska-Fairbanks, "[t]he scientists who are working on damage assessment can't even talk to each other if they've got different projects." *Id.*

199. *Id.* The state of Alaska would not release its studies until it had assurances that any negative conclusions about the state's role would not be used in lawsuits against it. Dietrich, *supra* note 130, at A5.

200. Fitzgerald, *supra* note 137, at 82 (statement by Zygmunt Plater, professor of law at Boston College). According to Plater, "plaintiffs' litigation-driven scientific experimentation" has provided some of the best science and information regarding illnesses resulting from toxic chemicals. *Id.*

201. See *id.*

202. *Id.* Whether scientific evidence may be sealed is questionable in itself. Accord-

VI. CONCLUSION

It seems unlikely that the glaring disregard for the environment displayed at the Hopewell plant and the Love Canal will occur today. Numerous environmental regulations, many of which were enacted in the 1980's and 1990's, restrict industrial dumping and disposal of all substances, not just hazardous ones. Our environment, however, will continue to be assaulted by the everyday, permitted discharges of hazardous substances, as well as the large, accidental oil spills and waste releases. Therefore, natural resource damage assessment regulations will continue to develop and expand. In what manner they expand may depend on a variety of factors, including further judicial review of the NRDA regulations, additional evaluation of contingent valuation, cooperation between lawyers and scientists regarding post-spill activities, and the lobbying activity of key industry players.

As the future of natural resource damage assessment unfolds, additional research and growing public awareness will continue to affect future legislation. Whereas the Kepone incident led to the creation of the Virginia Environmental Endowment Fund, the Love Canal situation led to the identification of similar problems nationwide and the creation of a federal Superfund for their remediation.²⁰³ Years later, the Exxon *Valdez* incident reinforced the need for OPA and the inclusion of passive-use values. Research regarding damage assessment itself will also lead to a better understanding of the environment itself and its natural ability to recover from hazardous injuries.

Public trustees should be compensated for natural resource damages for several reasons, including the compensation of individual losers and the deterrence of future accidents, in addition to the restoration of the environment.²⁰⁴ However, the parties responsible for environmental damages and the environ-

ing to Zygmunt Plater, Alaska's Freedom of Information Act and the federal Freedom of Information Act may require the release of certain evidence or information once it is no longer relevant to ongoing litigation. *Id.*

203. See Brown, *supra* note 159, at 23. The Exxon incident led to the final enactment of OPA.

204. See Castle et al., *supra* note 93, at 380-81 (expanding on these three reasons for trustee reimbursement).

mentalists trying to counteract the pollution may never agree on just what amount of compensation is justified and reasonable. There are inherent problems with any process of assessing damages to natural resources, and we may always question the capacity of economists to account for all relevant passive-use values empirically. However, the current regulations generally provide for natural resource damage assessment that is both cost effective and environmentally sound.

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