G R A D I E N T
TRENDS
Risk Science & Application

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Who Pays for Cleanup Costs?

By Kurt Herman, M. Eng.

Twenty-five years after Superfund transformed America's approach to cleaning up hazardous waste sites, the multi-billion dollar question remains – who pays for cleanup costs?

The question of who pays for cleanup costs is often determined under Superfund's cost allocation and recovery provisions, or through insurance claims. Beginning in 1980 under the "polluter pays" principle, Superfund legislation provided the U.S. EPA with new teeth to order cleanups, and allowed both "innocent" and Potentially Responsible Parties (PRPs) to recover some, or all, of their cleanup costs from other PRPs. Insurance carriers reacted to this and other new major environmental legislation, such as RCRA and the Clean Water Act, by adding limited pollution exclusion clauses to their Comprehensive General Liability (CGL) policies. This led to an absolute pollution exclusion by 1986, which removed virtually all environmental coverage. CGL insurance was first offered in the 1940s as "complete liability protection with no ifs, ands, or buts" (Goodman, 1991), including environmental liabilities such as cleanup costs. Thus, coverage should be available under CGL policies issued prior to the absolute pollution exclusion, allowing some insurance policy holders to recover cleanup costs from their carriers. For example, as of 1997, 40% of state Supreme Courts had issued decisions allowing pre-1986 CGL policy holders to recover cleanup costs at over half of the Superfund sites in the country (Sutherland, 1997).

…strict, retroactive, joint, and several liability ensures that PRPs who contributed even minor amounts of contamination decades ago may be responsible for funding an entire cleanup.

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I N S I D E

Letter to our Readers

January 2007

Dear Colleague,

As Gradient heads into its second decade of producing *Trends,* it's a good time to consider not only our own longevity, but also how long it takes for a contaminated site to proceed from discovery to closure. The potential for lengthy and costly site investigation and remediation leads companies to question whether all responsible parties have been identified, and whether the distribution of remedial costs is equitable. This issue of *Trends* examines methods to ensure that these needs are met.

Contributors to this issue include Mr. Kurt Herman, a Gradient environmental engineer specializing in cost allocation, Dr. Eric Butler, a Gradient forensic chemist, and Mr. Dave Merrill, a Gradient environmental engineer who specializes in chemical fate and transport. Joining them in our guest column are Barry Needleman and Michael Quinn, environmental attorneys with the McLane Law Firm who deal extensively with cost recovery and allocation. They give their thoughts on the effect of a recent Supreme Court decision.

We hope you'll find the information in this issue of *Trends* useful as you consider options to ensure that the costs of remedial actions are equitably distributed among responsible parties.

Yours truly,

Neil Shifrin, Ph.D.
President and Founder

Trends is a free publication of Gradient Corporation, a national leader in risk assessment and negotiation of risk-based remediation. If you have a colleague who would benefit from this publication, please contact Elizabeth Allen at (617) 395-5000 or email us at *trends@gradientcorp.com.*

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Who Pays for Cleanup Costs?

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Statistics show that multiple PRPs and insurers typically pay for any given hazardous waste site cleanup, and the costs are high (see figure). Most Superfund sites have between two and ten PRPs paying for cleanup, but approximately 13% of all Superfund sites have over 100 PRPs sharing in cleanup costs (Probst *et al.*, 1995). Estimates of average cleanup costs range from approximately $30 to 40 million for typical sites (ISO, 1995) to $140 million for "mega-sites" such as mining sites (U.S. GAO, 2005). Estimates of total (past and future) insurers' costs for Superfund cleanups range from $34 to $486 billion (ISO, 1995). For perspective, less than half of the nations in the world have annual Gross Domestic Products over $20 billion.

Cost recovery and allocation under Superfund is grounded in three sections (106, 107, and 113) of CERCLA. Section 106 allows the U.S. EPA to order cleanups by liable parties, with the threat of paying treble costs for failure to comply. Section 107 allows "innocent parties" (and in some situations, PRPs) to seek recovery of up to all cleanup costs from other PRPs. Section 113 allows PRPs to seek contribution from other PRPs for cleanup costs, with allocation of response costs according to undefined equitable factors. Under CERCLA, owners, operators, arrangers, and transporters may all be liable for cleanup costs. Superfund's principle of strict, retroactive, joint, and several liability ensures that PRPs who contributed even minor amounts of contamination decades ago may be responsible for funding an entire cleanup.

Six "Gore Factors" (proposed by former Vice President Al Gore when he was a Representative, but not included in the final Superfund laws) have often been used by the courts as a proxy for the equitable factors referred to in Section 113 to allocate remedial costs. The first five Gore factors deal expressly with a PRP's involvement with hazardous waste: 1) distinguishable discharge; 2) volume; 3) toxicity; 4) degree of involvement; and 5) standard-of-care, while the sixth deals with the degree of PRP cooperation in the cleanup. These six factors can be summed up into the principles of contamination causation (Gore Factors 1-4, see related article) and standard-of-care, then and now (Gore Factors 5-6, see related article). Causation analysis links the first four Gore Factors directly to remedial costs. Standard-of-care is a measure of "fairness," ensuring that past operations are not measured against current regulations or state-of-knowledge, as well as rewarding proactive, expedient cleanups. Depending on site-specific conditions, different allocation techniques can be used to apportion costs among the various PRPs (owners, operators, transporters, *etc.*).

The concepts of causation and standard-of-care are also key to receiving environmental insurance coverage. A plant owner/operator's expectation or intention at the time of causing what is now understood to be pollution relative to today's practices and knowledge, is often a key dispute for insurance claims for pre-pollution exclusion periods (*i.e.*, pre-1986) policies. Practices, knowledge, and policies have changed tremendously, and "legacy pollution" was an unfamiliar concept in the past.

Since Superfund, the legislature, private parties, insurers, and the courts have defined who pays for cleanup costs. However, the legal underpinnings have become murky (see guest editorial). The challenge going forward lies in providing clear direction to all parties to ensure an equitable distribution of cleanup costs, thereby promoting protective, cost-effective cleanups.

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Goodman, S.B. 1991. Insurance Coverage for Environmental Claims: Cost Recovery by Utilities and Pipeline Companies for Expenditures on Environmental Claims. *Nat. Gas Lawyer's J.* 5(1):91-111.

Insurance Services Office, Inc. (ISO). 1995. Superfund and the Insurance Issues Surrounding Abandoned Hazardous Waste Sites. December.

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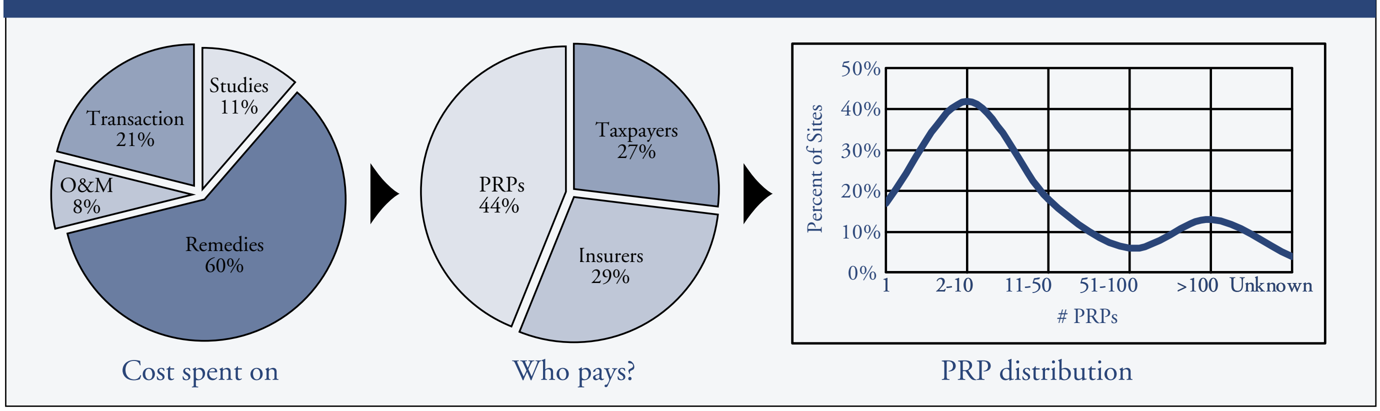
Typical Superfund Site



Note: Transaction = Costs not directly related to cleanup (mostly legal costs). O&M = Operations and maintenance.

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Forensics in Cost Allocation

By Eric Butler, Ph.D.

Simple, yet elegant applications of modern analytical techniques can provide valuable insight on the question of cost allocation.

Environmental forensics entails application of techniques to determine the source and/or age of a contaminant release and often plays a role in cost allocations. Chemical analyses can sometimes speak directly to the timing of a release by identifying age-specific compounds. For example, if a contaminated gas station has changed ownership over the years, determining the contamination release date might identify the party responsible for a release. The date of such a release can be based on the presence of lead additives or methyl tertiary butyl ether (MTBE), which were used over a certain time period, or on the basis of the lead isotopic composition, which varied with time. Chemical analyses can be useful in cost allocation, even when the analyses themselves do not provide a release date, as discussed in the examples below.

> ***Chemical analyses can be useful in cost allocation, even when the analyses themselves do not provide a release date…***

Polychlorinated biphenyls (PCBs) do not contain additives indicative of their age, but forensic characterization of PCB contamination was nevertheless integral to a cost allocation for a rail yard site where electric commuter rail cars were repaired and maintained from 1917 to 1995. Transformers in the rail cars contained PCBs from the 1940s to 1984. The extensive PCB contamination was discovered and cleaned up by the current rail companies under Superfund. In the litigation between the rail companies and the prior owner (pre-1976), several lines of reasoning were combined in the cost allocation, including the distinction between different types, or Aroclors®, of PCBs. Historical studies had indicated that most of the site contamination was Aroclor® 1260. Records research showed that Aroclor® 1260 production stopped in 1972, that the rail yard started purchasing Aroclor® 1254 in 1972, and that the newest railcars purchased from 1973-1975 came with Aroclor® 1254. Since most of the contamination of the site was from Aroclor® 1260, the prior owner was implicated as responsible for the vast majority of the releases, and consequently the cost of the cleanup.

Congener-specific chemical fingerprinting of the PCB molecules found in the rail yard soils confirmed the presence of

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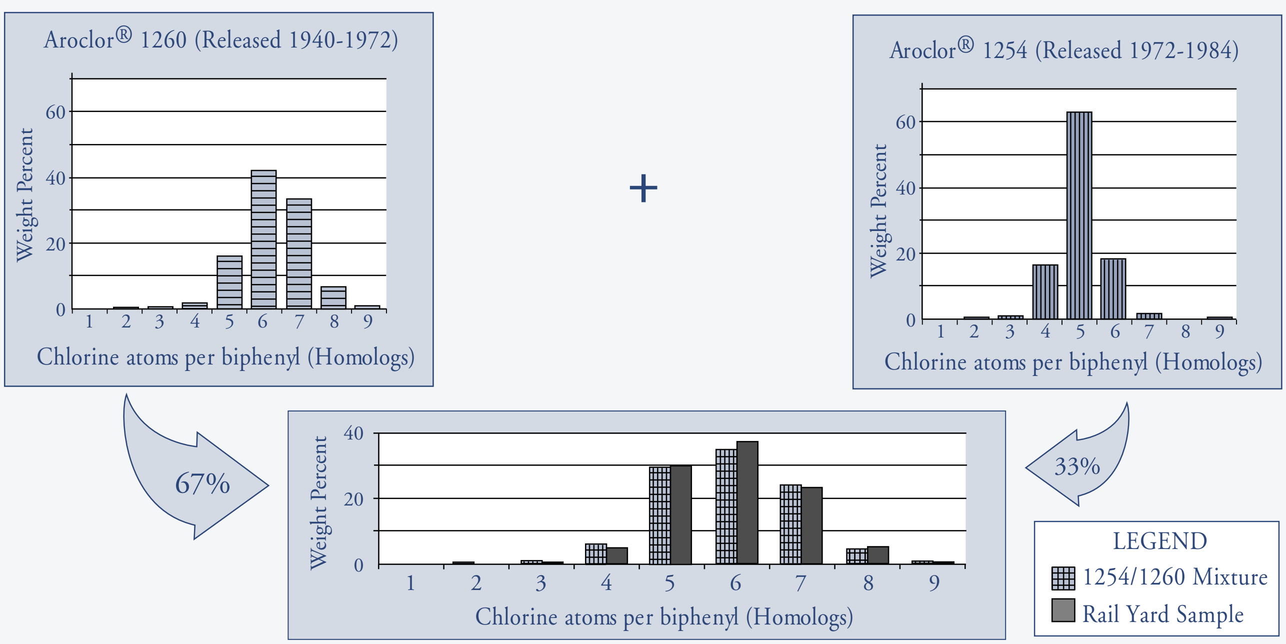
Two End Member Technique to Calculate Aroclor® Contribution



The Rail Yard samples are best represented by a mixture of Aroclors® rather than by either individual Aroclor®. Aroclor® 1260 released between 1940-1972 represented 67%, and Aroclor® 1254 released between 1972-1984 represented 33% of the contamination in the Rail Yard.

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Historical Waste Practices – Implications for Cost Recovery

By David Merrill, M.S.

Contemporaneous disposal practices must be viewed in the context of the standards of the time.

Several decades after passage of the landmark 1972 Clean Water Act and subsequent sweeping environmental laws such as RCRA, TSCA, and CERCLA, society continues to face enormous costs for cleaning up the legacy of chemical contamination in soils, groundwater, surface water, and sediment. Much of this contamination traces back to waste disposal practices that pre-date today's modern environmental statutes and regulations. When chemical releases occurred during a period covered under Comprehensive General Liability (CGL) insurance policies, the ability to recover the costs of environmental remediation often centers on a fundamental question: Was the contamination or damage resulting from the waste practice either "expected or intended?" While it may be tempting today to say we "should have known better" or done more to avoid environmental pollution problems earlier, we must set aside the 20-20 vision of hindsight.

While it may be tempting today to say we "should have known better" or done more to avoid environmental pollution problems earlier, we must set aside the 20-20 vision of hindsight.

Shifrin (2005), Tarr (1985), and Mutch and Eckenfelder (1993), among others, have examined the paradigm shift in the 20th century that evolved from the prevailing belief that the environment had a virtually limitless ability to self-purify, to the current scientific recognition of the finite waste assimilation capacity of our water, air, and soil. The passage of the 1972 Clean Water Act marked a major milestone in this paradigm shift, and changes in waste management practices evolved as subsequent environmental regulations were promulgated. In addition, the initial emphasis on pathogenic diseases and sanitary pollution shifted in the 1970s toward industrial chemical wastes. This shift was made possible by advances in laboratory analytical techniques that allowed chemicals to be measured at trace levels in the environment. Meanwhile, the evolving understanding of potential chemical hazards in the workplace that emerged from industrial hygiene studies of occupational exposures translated only slowly into an understanding of possible environmental concerns, in part because the medical and engineering disciplines did not necessarily communicate with one another (Sellers, 1994).

The almost 50-year "lifecycle" of polychlorinated biphenyls (PCBs), from their first industrial use in the 1930s, to their voluntary removal from the U.S. market in 1976, provides a prominent case in point (Shifrin and Toole, 1998). The fireproof nature and chemical stability of PCBs were properties that made these compounds well-suited for a diverse range of uses, from electrical transformers to prevent fires in populated areas, to plasticizers to enhance the durability of paints, varnishes, and a myriad of other products. In 1966, the first environmental concerns regarding PCBs surfaced when PCBs were identified in fish and eagles by a Swedish researcher testing for DDT residues. While this event triggered a subsequent period of intense scrutiny, an understanding of the environmental impacts evolved gradually as government, academic institutions, and industry studied the complex issues and trade-offs. Ten years following their environmental discovery, the manufacture and sale of PCBs ceased in the U.S.

The PCB story provides a good perspective on how knowledge, and therefore practices, changed with time. Not until 1966 did we have any inkling that PCBs might cause environmental problems. An understanding of when information became available is critical to insurance cost recovery because costs due to contamination that would have been "expected or intended" are typically not covered by insurance policies. Whether historical industrial chemical releases were "expected or intended" to cause environmental damages must be assessed within this historical context, not from today's vantage point.

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Shifrin, N.S. 2005. Pollution management in the twentieth century. *J. Environ. Eng.* 131:676-691.

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Tarr, J.A. 1985. Historical perspectives on hazardous wastes in the United States. *Waste Manag. Res.* 3:95-102.

What's New at Gradient

Appointments

Julie E. Goodman has been accepted to the American College of Epidemiology.

Recent Articles

Martin, D.N., B.J. Boersma, T.M. Howe, **J.E. Goodman,** L.E. Mechanic, S.J. Chanock, and S. Ambs. 2006. Association of MTHFR gene polymorphisms with breast cancer survival. *BMC Cancer.* 6:257.

Sax, S.S., D.H. Bennett, S.N. Chillrud, J. Ross, P.L. Kinney, and J.D. Spengler. 2006. A cancer risk assessment of inner-city teenagers living in New York City and Los Angeles. *Environ. Health Perspectives.* 114:1558-1566.

Recent Presentations

Nicosia, Cyprus. November 7, 2006. Peter A. Valberg. "What is EMF? How EMF interacts with Living Organisms," presentation at Cyprus International Institute for the Environment and Public Health in Association with Harvard School of Public Health Symposium: "Electromagnetic Fields (EMF): Sources, Health Effects and Regulations." **Peter A. Valberg** also chaired the "Regulations of EMF" session at the same conference.

Upcoming Presentations and Posters

Charlotte, NC. March 24-29, 2007. 46th Annual Meeting of The Society of Toxicology:

- **Barbara D. Beck** and **Ari S. Lewis.** "Using Modeling to Inform the Risk Assessment Process for Arsenic."
- **Teresa S. Bowers** and **Peter A. Valberg.** "Non-Linear Exposure-Response Relationships Between Ambient PM_{10} and Daily Mortality."
- **Julie E. Goodman,** David Gaylor, **Leslie A. Beyer, Lorenz R. Rhomberg,** and **Barbara D. Beck.** "MTBE Is Not Associated with a Statistically Significant Increase in Leydig Cell Tumors in Sprague-Dawley Rats."
- **Julie E. Goodman,** E.E. McConnell, I.G. Sipes, R.J. Witorsch, **Tracey M. Slayton, Carrie J. Yu, Ari S. Lewis,** and **Lorenz R. Rhomberg.** "An Updated Weight of the Evidence Evaluation of Reproductive and Developmental Effects of Low Doses of Bisphenol A."
- **Tom A. Lewandowski.** "Risk Assessment for Exposures to PCBs from Interior Building Surfaces."

Forensics in Cost Allocation

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Aroclors® identified during historical investigations, and enabled quantification of the proportion of Aroclors® 1254 and 1260 at the site. This information became a weighting factor in the cost allocation, along with a "handling practices" weighting factor, to adjust the years and volume of PCB use in the allocation (see figure). The allocation combined chemistry data, records research, worker testimony on waste handling practices, and thoroughly addressed the Gore Factors (see related article) in arriving at an equitable allocation that resulted in the recovery of $38 million for the rail companies.

Chlorinated solvents also are amenable to forensic approaches. Compound-specific isotope ratio analysis (determination of the relative proportion of carbon 13 to carbon 12 in specific chemicals) can show whether contamination is from a "fresh" release, or is the degradation product of "old" releases. In one case involving groundwater contaminated by perchloroethylene (PCE) and trichloroethene (TCE), a dispute arose between the current and prior owners over the TCE contamination. The current owner had never used TCE and blamed the prior owner, who, in turn, asserted that the TCE came from the biodegradation of the PCE which had been used by the current owner. Laboratory and field studies have shown that the carbon in TCE that results from the biodegradation of PCE is isotopically lighter than the carbon in the PCE from which it derives. Compound-specific carbon isotope ratio analysis performed on groundwater samples showed that the TCE could not have come from the biodegradation of the PCE, because the isotope ratio in the TCE was heavier, indicating that TCE itself had been released, clearly implicating the prior owner.

These few examples illustrate the utility of forensics in cost allocation/recovery efforts. Through a variety of techniques, information relating to the timing or origin of environmental contamination can be developed that directly speaks to equitably distributing the costs of remediating a site.

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By The Way...

Current U.S. life expectancy is at an all time high of 77.6 years compared to 75.4 years in 1990.

Source: National Center for Health Statistics, 2004 (http://www.cdc.gov/nchs/).

Guest Editorial: Management Decision-Making in a Post-*Aviall* World

By Barry Needleman, Esq. and Michael Quinn, Esq.

A recent Supreme Court decision has profound implications for liable parties that perform work voluntarily.

The pressures facing corporate environmental managers and counsel have increased dramatically in the past two years because of the United States Supreme Court decision in *Cooper Industries, Inc. v. Aviall Services, Inc.* This decision severely limited the ability of voluntarily performing potentially responsible parties (PRPs) to obtain contribution from other liable parties.

The maxim "no good deed goes unpunished" has never been more apt.

PRPs had always understood that it was very difficult to escape liability. Consequently, conventional wisdom held that, in most cases, it was better to cooperate with regulators than to oppose them. That approach was based on the perceived ability to bring contribution claims against other liable parties under CERCLA Section 113. *Aviall* destroyed that conventional wisdom by altering the common understanding of CERCLA's contribution provisions. Since *Aviall* is settled law, PRPs must therefore make strategy choices with that law in mind, and consider alternative ways to obtain contribution from other PRPs.

Aviall held that a "private party who has not been sued under CERCLA Sections 106 or 107(c) may not obtain contribution under Section 113(f)(1) from other liable parties." Essentially, the Supreme Court ruled that a liable party that performs *voluntarily* may not seek contribution from other liable parties. The maxim "no good deed goes unpunished" has never been more apt.

Given this landscape, the question is, what options remain? There are several. As discussed in *Aviall*, a Section 113(f)(1) contribution claim may be available to some parties. A party that performed voluntarily, and has resolved its liability to the federal or state government through an "administratively or judicially approved settlement," may seek contribution under Section 113(f)(3). *Aviall* also left open the possibility of a Section 107 cost recovery claim. There has been significant activity at the Circuit Court level during the past two years on that issue, and the Supreme Court will likely address the applicability of section 107 claims some time soon. Finally, PRPs should assess the availability of remedies under state law.

Given this current state of the law, companies facing environmental liabilities must address numerous critical issues at the beginning of any case. Should the company cooperate, or refuse to do so and invite litigation? Should it negotiate a final settlement immediately, though it may have to do so from a position of weakness? Should it proceed voluntarily and hope the law will develop favorably? Is there a state law remedy it can rely upon? There are rarely clear answers, but the questions cannot be ignored. Failure to think strategically from the moment a "PRP" letter arrives can cost a company millions.

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Who Pays for Cleanup Costs?

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Probst, K.N., D. Fullerton, R.E. Litan, and P.R. Portney. 1995. Footing the Bill for Superfund Cleanups: Who Pays and How? The Brookings Institution: Resources for the Future, Washington, D.C., 176p.

Sutherland, D. 1997. Superfund Awakes in State Supreme Courts. *RiskWorld News,* December 5.

U.S. Government Accountability Office (GAO). 2005. Environmental Liabilities, EPA Should Do More to Ensure That Liable Parties Meet Their Cleanup Obligations. GAO-05-658. August.

In the next issue:

What Epidemiology Can Contribute to Risk Analysis

When Are Disease Clusters Real?

The Use of Human Data in Risk Assessment

Guest Editorial: The Use of Meta-Analyses for Epidemiology Studies

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