TO THE HONORABLE PRESIDENT OF THE SOLE PROVINCIAL COURT 0F JUSTICE OF SUCUMBIOS:

Pablo Fajardo Mendoza – In my capacity as Legal Representative for Maria Aguinda and others in lawsuit No. 02-2003, which is being pursued in this judicature against Chevron Corporation, previously Texaco, because of environmental damage, I appear and hereby submit the third part of the legal report, authorized under the applicable legal provisions for this phase of the suit and that were mentioned in your ruling of December 17, 2010.

The second part of the plantiffs' report provides a specialized, factual, and duly documented description of the way in which Chevron is responsible for the damage caused and still unresolved in the concession area.

In this document, you Deputy President will find a detailed factual analysis of economic criteria which can be used for issuing a resolution or sentence in this litigation.

The analysis of economic figures is broken down into categories of damages. This means that it encompasses the various components that are directly associated with the consequences of Texaco's operations in the Concession area. As you will see, all of the components or categories of environmental damage are also fully related or addressed in the plaintiffs' claims in their lawsuit filed in May 2003. In addition to the above, the analysis also includes a review of various alternatives that could be implemented. The cost of redress varies in each case depending on the extent of environmental remediation.

Honorable Deputy President, the plaintiffs in this case believe that this document will be of great use to you in making a decision or issuing a ruling in this case.

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I. INTRODUCTION

The Plaintiffs' report submitted to this Court on January 17, 2011 contains a summary of a vast record of overwhelming and unassailable evidence demonstrating Chevron's liability in this case. The evidence submitted by the parties is part of a dossier that Chevron has desperately tried to bury beneath an avalanche of malicious communications and requests that address anything but the merits of this cause. This dossier reveals serious contamination at each of the sites examined during the course of this trial – contamination which has been identified not only by Plaintiffs and third parties, but also, in many instances, by Chevron's own technical experts. The dossier also establishes beyond any doubt that Texaco's practices violated Ecuadorian law, were completely inadequate compared to the industry's customary practices, constituted a breach of Texaco's operation contract, and violated the company's legal duty to exercise due care in its activities in Ecuador. Indeed, perhaps the most irrefutable condemnation of Texaco's practices in Ecuador comes from none other than the company's own environmental auditors. Worse yet, the dossier reveals that Texaco adopted an unconscionable policy of destroying evidence of its environmental malfeasance or, alternatively, deliberately neglecting to document environmental incidents *unless* the media had previously learned about them from independent sources.

In this third report submitted by Plaintiffs in this phase of the process, Plaintiffs present the Court with the various possibilities for assessment and appropriate redress of the harm summarized in our communication dated January 17, 2011. We will describe the several categories of damages that can and should be awarded to make right the many wrongs that Texaco left behind: (1) *real* remediation of the soil and groundwater affected by *all* of the toxic waste-filled pits dug by Texaco. This should compensate in part for Texaco's feeble remediation conducted in the 1990s; (2) compensation for damages to the delicate rainforest ecosystem and the many vital benefits provided by that ecosystem that may never be fully regained regardless of how much remediation is completed; (3) funding to repair the cultural fabric of the affected communities, whose entire life style depends on their relationship with a rainforest environment that is now decimated; (4) Chevron's disgorgement of the excess profits reaped by Texaco as a direct result of the company's malfeasance – necessary to ensure that companies like Chevron do not conclude that it would be more profitable to violate the law and clean up only if they get caught, than would to simply follow the rules; (5) funding for providing adequate medical care to people who now have healthcare needs far exceeding what would have been necessary had Texaco not chosen to use their communities as a toxic waste dump site; (6) compensation for cancer deaths – both actual and anticipated – in excess of what would normally be expected in the indigenous peoples of the Amazon basin in absence of Texaco's introduction of carcinogenic agents into the environment; and (7) funding for the delivery of drinking water to people who can no longer

safely drink from and bathe in the once relatively pristine natural waterways adjacent to their communities as a result of Texaco's use of those water sources as an outlet for toxic waste.

For its part, Chevron has adopted the stance that the amounts of damages estimated by several experts, whose bills are *not* paid by Chevron, are in this case simply too high to be considered credible. As it marches across the world launching last-minute additional attacks on this litigation, Chevron, in an effort to portray this case as farcical and to portray Plaintiffs' experts as scoundrels, likes to place emphasis on the word "*billion*" – as if to dismiss as absurd the very notion that the company's liability could be in the multiple *billions* of dollars. But precedent confirms the validity of the amount in US dollars at stake in this case. Prominent banking institutions from the US private banking system, such as Goldman Sachs, have estimated British Petroleum's ("BP") liability for its 2010 "Deepwater Horizon" oil spill in the Gulf of Mexico to be as high as $200 billion. There is also a more recent conservative analysis performed by the Associated Press placing BP's liability at anywhere between $38 billion and $60 billion.[1] To put these numbers in perspective, the United States government has estimated that the BP spill released approximately 205 *million* gallons (776 million liters) of crude oil into the environment over the course of approximately *four months* between April 20, 2010 and July 15, 2010.[2] In contrast, Texaco engaged in the systemic contamination in Ecuador over the course of almost *three decades*, to the tune of between 16 and 20 *billion* gallons (ca. 61 and 76 billion liters respectively) of toxic wastewater discharged onto the land and into the surface water. And that is to say nothing of Texaco's depositing of chemical-laced drilling muds and other toxic sludge-like sediment into hundreds of waste pits carved into the jungle, the hundreds of documented crude oil spills, and undoubtedly hundreds or even thousands more spills of which there is no record, owing to Texaco's two-headed policy of record destruction and non-reporting.

Moreover, the fact is that BP swiftly acknowledged its duty by voluntarily allocating a 20-billion dollar fund to pay for claims lodged by individuals and businesses affected by that spill, while Chevron, on the other hand, has promised to fight the indigenous communities of the Eastern region until "hell freezes over"[3]. This is a clear example of the way in which oil companies like Chevron appear to assign a much lower value to human life in certain parts of the world. If the Plaintiffs were residents of the State of Texas and Louisiana rather than the Provinces of the Ecuadorian Amazon, there is no question that justice would have been done

[1] Kahn, C., *BP's spill costs still look manageable 8 months later*, ASSOCIATED PRESS, Dec. 29, 2010, *available at* http://www.msnbc.msn.com/id/40842029/ns/us_news-environment/.

[2] Hoch, M., *New estimate puts Gulf oil leak at 205 million gallons*, PBS, Aug. 2, 2010, *available at* http://www.pbs.org/newshour/rundown/2010/08/new-estimate-puts-oil-leak-at-49-million-barrels.html#.

[3] Otis, J., *Chevron vs. Ecuadorian Activists*, THE GLOBAL POST, May 3, 2009, *available at* http://www.globalpost.com/dispatch/the-americas/090429/chevron-ecuador?page=0,2#.

long ago. It is impossible to imagine Chevron threatening a group of Americans with a "lifetime of litigation" if they would dare to attempt to hold the company accountable. This simply would not happen. In short, while there are in deed differences between the relatively short-lived BP spill in the Gulf of Mexico and Texaco's systemic pollution of the Amazon basin that render the comparison less than perfect, one thing is certain: there is absolutely *nothing* outrageous or crazy in asserting that Chevron's liability in this case reaches well into the billions of dollars.

The reports speaking to the issue of damages prepared by Chevron's experts in this case share at least one trait in common: they all embody Chevron's strategy of "tearing down" – identifying alleged flaws in the methodologies of any expert who dares to find the existence of damages, and indeed, to undermine the character and qualifications of those experts. Yet this is merely throwing stones at the work of others in an attempt to raise some level of doubt – an increasingly common and disturbing tactic employed by certain corporations[4] –, but it will not suffice. Case in point: One of Chevron's key points in the discussion of the issue of damages – an idea featured prominently in many of its experts' reports – is that Plaintiffs' estimated number of approximately 916 pits is supposedly inflated. Among other quibbles, Chevron criticizes the aerial photographs used for identifying the pits dug by Texaco. The problem with Chevron's argument is that, while Chevron takes issue with Plaintiffs' position, it never really takes a position of its own. If there are not 916 pits, how many pits are there according to Chevron? Chevron does not answer this question because – as it told the CBS television news program *60 Minutes* in 2009 when offered the chance to publicly justify its claims that Plaintiffs were wrong about the pits – Chevron **does not have a record** of all of the pits that were dug

[4] In an article entitled *DOUBT Is Their Product*, which appeared in the Scientific American magazine in 2005, Dr. David Michaels, Assistant U.S. Secretary of Labor for Occupational Safety and Health, discusses how scientists bought and paid for by American industry have adopted the practice of raising doubt about perfectly sound science as a means of evading regulation and liability, to the overall detriment of scientific integrity in the field of toxic exposure:

> Because absolute certainty is rarely an option, regulatory programs would not be effective if such proof were required . . . . Uncertainty is an inherent problem of science, but manufactured uncertainty is another matter entirely. Over the past three decades, industry groups have frequently become involved in the investigative process when their interests are threatened. If, for example, studies show that a company is exposing its workers to dangerous levels of a certain chemical, the business typically responds by hiring its' own researchers to cast doubt on the studies. Or if a pharmaceutical firm faces questions about the safety of one of its drugs, its executives trumpet company sponsored trials that show no significant health risks while ignoring or hiding other studies that are much less reassuring. The vilification of threatening research as "junk science" and the corresponding sanctification of industry-commissioned research as "sound science" has become nothing less than standard operating procedure . . . .

Michaels, D., *Doubt is Their Product*, SCIENTIFIC AMERICAN, June 2005, *available at* http://www.scientificamerican.com/article.cfm?id=doubt-is-their-product.

into the jungle floor.[5] In fact, it seems likely that these records went the way of Texaco's spill records – that is, into the paper shredder. Perhaps if Texaco did not have a penchant for destroying evidence of its misconduct, experts would not need to go to lengths such as aerial photography to find Texaco's hidden pits. But as it is, Chevron must live with the consequences of its predecessor's dubious policies.

The record in this case is cluttered with similar efforts by Chevron to obfuscate that which is abundantly clear, namely: (1) there is pervasive toxic contamination in the soil and in the waters of the Oriente region resulting from oil production operations; (2) Texaco's conscious choice to pollute as a means of increasing profit margins caused that contamination, and Chevron cannot avoid responsibility by pointing the finger at others who may or may not also have polluted; and (3) Chevron must be ordered to pay damages to redress the devastation caused by Texaco and to assure that the company has not, in the end, profited from its predecessor's malfeasance. The remainder of this submission will present a summary of the nature, applicability, and economic valuation of each of the specific categories of damages listed above, and will conclude with Plaintiffs' specific plea for appropriate damages based on the dossier of this case on file at this Court.

II. REMEDIATION OF SOIL AND GROUNDWATER DAMAGE

As articulated in Plaintiffs' original complaint filed almost eight years ago, "the elimination or removal of contaminant elements that still threaten the environment and health of the inhabitants" lies at the core of the damages of which evidence has been provided.[6] This means that the most important category of damages is an award of the reasonable, estimated costs of remediation of the soil and groundwater damage at the sites contaminated by Texaco's operations in the Napo Concession.[7]

A. REMEDIATION COST ASSESSMENT

[5] *Amazon Crude*, CBS NEWS, May 3, 2009, *available at* http://www.cbsnews.com/stories/2009/05/01/60minutes/main4983549_page3.shtml?tag=contentMain;contentBody ("Chevron says Texaco cleaned 162 pits. But court expert, Richard Cabrera, puts the total number of waste pits at 916. Chevron says Cabrera's number is inflated. So *60 Minutes* asked Chevron about a master list of all the pits that existed when Texaco left Ecuador. Last week Chevron told us that there is no master list").

[6] Corpus 1, Folio 77: Plaintiffs' Complaint, at VI.1 (May 7, 2003).

[7] Although site inspections revealed the presence of numerous toxic chemical compounds in the soil and groundwater, TPH is the primary constituent and has been studied most extensively. Therefore, for purposes of analyzing remediation costs, TPH will be the benchmark constituent.

We will begin by analyzing the soil and groundwater remediation cost estimate performed in September 2010 by Douglas C. Allen, P.A. ("DCA"), a consulting firm that specializes in helping organizations to define, quantify, and manage their high risk environmental exposures and liabilities.[8]

DCA expressly set out to develop a "*conservative*" cost estimate for the remediation of soil and groundwater contamination in the Napo Concession.[9] In order to reach this valuation, DCA's analytical framework integrated three basic components:

(1) *The benchmarks for acceptable levels of environmental contaminants in Ecuador.*. As an initial matter, DCA accepted the fundamental premise that, pursuant to Decree No. 1215, the Ecuadorian soil quality standard for total petroleum hydrocarbons ("TPH") in "sensitive ecosystems" (1,000 ppm) should apply here, regardless of Chevron's ludicrous assertion that the soils of the Amazonian rainforest (unquestionably the most sensitive ecosystem on earth) should be deemed "agricultural" or perhaps even "industrial".[10] As an alternative soil remediation standard, DCA also built a cost estimate designed to achieve TPH of 100 ppm for two reasons: (a) Petroecuador's project for remediation of the pits in the Amazon Region establishes that a TPH level of 100 ppm or less constitutes 100% environmental quality; and (b) although many states in the U.S. have adopted chemical-specific risk-based standards (as opposed to broader TPH), a few states have a adopted a TPH soil cleanup standard of 100 ppm or less.[11] With regard to groundwater, DCA adopted the 0.325 mg/l water quality standards for TPH set forth in Decree No. 1215.[12]

(2) *U.S. environmental law and guidance documents for investigation and remediation of contaminated sites carried out under the Comprehensive Environmental Reclamation, Compensation and Liability Act ("CERCLA").*

[8] Among other relevant past engagements, DCA has served as a neutral expert charged with allocating investigation costs at the U.S. Environmental Protection Agency (EPA) when a "Superfund" (name of the remediation mechanism under American law) was created among various parties potentially responsible for contamination, and has performed due diligence and environmental liability assessments in advance of mergers and acquisitions on behalf of private companies. The firm's director, Douglas Allen, holds a graduate degree in Engineering from Dartmouth College, one of the most respected universities in the United States. Mr. Allen has over 25 years experience as an environmental consultant for complex, risky commercial transactions, matters, and disputes.

[9] Corpus 1964, Folio 206.294. Allen's economic criteria. September 2010.

[10] Corpus 1964, Folio 206.294. Allen's economic criteria. September 2010; *see also* Transcript of Douglas C. Allen's deposition from Dec. 16, 2010, at 260:14-23. Chevron's argument is apparently premised on the circular (and outrageous) logic that because Texaco paved over portions of the rainforest in the process of turning it into a toxic dumping ground, the rainforest should now be considered "industrial" property for purposes of determining how clean it needs to be.

[11] Corpus 1964, Folio 1964 Folio 206.294 Economic criteria.

[12] Corpus 1964, Folio 206.295. Economic criteria.

Although CERCLA is, of course, a United States statute with no direct Ecuadorian equivalent, DCA recognized that the well-developed body of knowledge arising out of the CERCLA's "Superfund" program is a fruitful well from which to draw in this case regarding remedial technologies and criteria for assessing the overall effectiveness, feasibility, and cost of remedial measures for soil and groundwater.[13]

(3) *Standard cost estimation methods developed by the American Society for Testing and Materials (ASTM)*. Based on the available data, DCA selected the "Range of Values" method of calculating remedial costs from among five possible methods identified by the ASTM.[14] As suggested by its name, this method entails developing cost estimates as a range of values from high to low, based on a set of reasonable assumptions.[15]

The vast majority of DCA's assumptions regarding the topography and climate, characteristics of the soil, surface water, and groundwater at the Napo Concession, and the history of oil field development in the Concession are derived from the audits performed in the 1990s by Texaco's environmental auditors, including HBT Agra, Fugro-McClelland, and Woodward-Clyde.[16] Assumptions regarding the nature and extent of the contamination at the various sites within the Concession are derived from those audit reports, as well as the data obtained by both parties during the judicial inspections of the Site in this case and the data resulting from the field inspections by engineer Richard Cabrera.[17]

DCA's conceptual framework for developing a cost estimate for soil remediation rests on the fundamental premise that not all sites in the Concession area are contaminated to the same degree – some are worse than others.[18] In order to account for this fact – and to achieve a conservative estimate – DCA adopted a slightly modified version of the well site "scoring system" proposed by Texaco's auditor, HBT Agra.[19] Under this modified system, 41% of the well sites were treated as "low-impact" sites, 18% were treated as "medium-impact" sites, and another 41% were treated as "high-impact" sites requiring the greatest level of remediation. Based on the data and operational history concerning the production stations, each of the 22 production stations was treated as "high-impact".[20]

[13] Corpus 1964, Folio 206.295 Economic criteria.

[14] Corpus 1964, Folio 206.295 Economic criteria.

[15] 1964, Folio 206.295, Economic criteria.

[16] Corpus 1964, Folio 206.297-206.301, Economic criteria

[17] Corpus 1964, Folio 206.301-206.303, Economic criteria.

[18] Corpus 1964, Folio 206.304, Economic criteria.

[19] Corpus 1964, Folio 206.305, Economic criteria.

[20] Corpus 1964, Folio 206.305, Economic criteria.

DCA also considered the average volume of soil that would need to be remediated in relation to each pit.[21] DCA used the sampling data from the judicial inspections to create a plot of TPH concentration versus depth beneath the pit surface. Based on the results of this plot, DCA concluded that remediation for 1,000 ppm would generally require excavation to a depth of 3 meters, and remediation for 100 ppm would generally require excavation to 5 meters.[22] In determining how much soil would actually require remediation, DCA assumed that there is one meter of "freeboard" present in all pits, meaning that previously existing liquids have been removed or seeped to lower depths, or, alternatively, that the pit has been covered with a layer of soil in accordance with Ecuadorian standards.[23] Thus, in calculating soil volumes, DCA used net soil depths of 2 and 4 meters (for 1,000 ppm and 100 ppm, respectively). In further assessments of soil volume in need of remediation, DCA also recognized that soils within 1 meter around the perimeter of each pit, at a depth of 2 meters, would have been impacted by events like spillage and overtopping, and thus, will require excavation.[24] DCA also believes that remediation out to a radius of 15 meters around each well head to a depth of 1 meter would be appropriate.[25]

Finally, DCA conducted an independent screening of potential, cost-effective remedial technologies that might be suitable to achieve the targeted TPH soil cleanup levels of 1,000 ppm and 100 ppm.[26] DCA finally selected composting and thermal desorption as the treatment technologies of choice for the high-end and low-end cost estimates for remediation to the 100 ppm and 1,000 ppm TPH levels, respectively.[27] DCA calculated a unit cost of $\$118/m^3$ for composting and $\$304/m^3$ for thermal desorption – costs that reflect a *discount* to account for economies of scale and clustering of sites, among other factors.[28] DCA concluded that composting technology would be sufficient to remediate contaminated soils at "low-impact" sites.[29] For the medium- and high-impact sites, DCA concluded that thermal desorption would be the most time-efficient and reliable technology to reduce concentrations to the target cleanup levels in light of the fact that: (1) thermal desorption will achieve the clean-up goals in a relatively short period of time; (2) it will remove the contaminants from the environment and therefore will result

[21] Corpus 1964, Folio 206.305-206.306, Economic criteria.

[22] Corpus 1964, Folio 206.305-206-306, Economic criteria.

[23] Corpus 1964, Folio 206.306, Economic criteria.

[24] Corpus 1964, Folio 206.306, Economic criteria.

[25] Corpus 1964, Folio 206.306, Economic criteria.

[26] Corpus 1964, Folio 206.306, Economic criteria.

[27] Corpus 1964, Folio 206.306, Economic criteria.

[28] Corpus 1964, Folio 206.306, Economic criteria.

[29] Corpus 1964, Folio 206.306, Economic criteria.

in a permanent clean-up; and (3) it does not require on-going monitoring to document performance.[30] Based on the foregoing framework, DCA calculated a remediation cost estimate ranging from a low-end figure of **$486,969,221** for cleanup to the 1,000 ppm level to a high-end figure of **$948,934,409** for cleanup to the 100 ppm level.[31]

DCA used a similar approach with regard to its remediation cost estimate for groundwater. Once again, DCA's approach was highly conservative – DCA's conceptual model assumed that dissolved phase groundwater contamination is not widespread or migrating significantly such that off-site risks are present.[32]

With respect to the 22 production stations, the basic premise of DCA's groundwater analysis was that a station would require remediation in proportion to the volume of oil and production water that was processed through it.[33] The production sites were accordingly categorized within one of four levels dependent upon volume throughput – at a "Level 4" station, for instance, one would expect to find 4 times the amount of groundwater contamination than what one would find at a "Level 1" site.[34] With respect to well sites, DCA assumed that only the 210 well sites falling within the "medium-impact" and "high-impact" categories would require remediation – the remaining 146 sites in the "low-impact" category were excluded from the calculation of groundwater remediation.[35]

Having targeted the appropriate well sites and established an appropriate estimate for the variable levels of remediation necessary at the production sites, DCA considered two different options for groundwater remediation technologies.[36] As a viable low-cost option, DCA offered containment and recovery of petroleum product using a horizontal recovery trench with a vertical sump.[37] For "Level 1" stations – requiring the least remediation – the recovery trench would be approximately 100 meters long by 2 meters wide by 5 meters deep.

The trench for a "Level 4" station would be, of course, four times larger.[38] The operation and maintenance periods for the Level 1-4 trenches would be 10,

[30] Corpus 1964, Folio 206.306, Economic criteria.

[31] Corpus 1964, Folio 206.307, Economic criteria.

[32] Corpus 1964, Folio 206.308, Economic criteria.

[33] Corpus 1964, Folio 206.309, Economic criteria.

[34] Corpus 1964, Folio 206.309, Economic criteria.

[35] Corpus 1964, Folio 206.309, Economic criteria.

[36] Corpus 1964, Folio 206.305, Economic criteria.

[37] Corpus 1964, Folio 206.305, Economic criteria.

[38] Corpus 1964, Folio 206.305, Economic criteria.

15, 20, and 30 years, respectively.[39] However, DCA noted that the recovery trench method – while cost effective – may not result in the remedial goal of 0.325 mg/L being met within the projected timeframe. It is expected that the long-term *natural* attenuation process would continue for 20 years after completion of "active" remediation.[40] A higher cost alternative would be to add an active groundwater pumping and treatment system to the low-cost structure.[41] Again, that system would be four times larger at a Level 4 site than that which would be required at a Level 1 site. DCA predicts that with such a system, the remedial goal of 0.325 mg/L would be met within 15, 20, 30, and 50 years for Levels 1-4, respectively – no subsequent natural attenuation would be necessary.[42] Based on the foregoing assumptions and analysis, DCA estimated that the potential costs to remediate contaminated groundwater at production stations and well sites to the standard of 0.325 mg/L for TPH range from a low-end estimate of **$394,291,285** to a high-end estimate of **$910,818,627**.

The March 2008 report with the findings from the global damages assessment, as amended in November 2008 (collectively, the "Cabrera Report"),[43] also analyzes the issue of soil and groundwater remediation costs. With regard to the remediation of soils, the Cabrera Report does not utilize a tier system for wells and production sites. Instead, referencing the Judicial Inspection data, the Cabrera Report analysis is premised on the assumption that all pits at the productions stations require remediation, but only 80% of the pits at the well sites will have to be remediated.[44] In calculating soil volume, the Cabrera Report (March 2008) postulates that in addition to the pits, an area surrounding the pits amounting to roughly 50% of the surface area of the pits also must be remediated, resulting in a total area of remediation of 947,000 m^2.[45] Based on a plot of TPH by soil depth, it is concluded that pit remediation must occur to a depth of 4 meters on average – resulting in a total of 3,788,000 m^3 of soil to be remediated.[46] The Cabrera Report also identifies a litany of remediation technology options, concluding that *ex-situ* bioremediation – the removal of waste material, the introduction of microbes and nutrients to treat

[39] Corpus 1964, Folio 206.309, Economic criteria.

[40] Corpus 1964, Folio 206.309, Economic criteria.

[41] Corpus 1964, Folio 206.309, Economic criteria.

[42] Corpus 1964, Folio 206.309, Economic criteria.

[43] Chevron has made a number of allegations regarding the integrity, correctness, and independence of the entire Cabrera Report, and the relationship between plaintiffs and Mr. Cabrera and his team. Of course, the essential nature of these allegations of incorrectness is due to the procedure by which the report was created. To the extent the Court considers the Cabrera Report in its ruling, several of these allegations have been put before your Honor by Chevron in many filings. Additionally, Plaintiffs will shortly file a supplemental portion of the Alegato Final summarizing the essential allegations. Plaintiffs request that the Court consider the allegations of both parties on this issue in reaching its ruling in this case.

[44] Corpus 1299, Folio 139.771-139.772.

[45] Corpus 1299, Folio 139.772.

[46] Corpus 1299, Folio 139.774.

that material, and placement of that material back into the original excavation – would be a viable technology at a relatively low cost compared to that of other options.[47] Finally, the Cabrera Report establishes a unit cost estimate for remediation by examining the historical unit costs of ex situ bioremediation at seven analogous cleanup sites involving compounds such as TPH, BTEX, and PAH (all at issue in this case), resulting in an average unit cost estimate of $\$489/m^3$.[48] Lastly, the Cabrera Report (March 2008) identified a soil remediation cost estimate of **$1,852,000,000**.[49] In the event that remediation to the more protective standard of 100 ppm of TPH is deemed appropriate, the Cabrera Report (November 2008) identifies a remediation cost estimate of **$2,743,000,000**.[50]

As to groundwater, the Cabrera Report notes the presence of TPH in groundwater revealed through the judicial inspections.[51] However, the Cabrera Report also notes that to obtain a true picture of the extent of groundwater contamination would involve spending millions of dollars over a certain period of time to collect data – data that Texaco should have collected during the course of its operations, yet another standard procedure that Texaco did not follow.[52] As such, the Cabrera Report states that it "cannot establish the cost of cleaning up underground water".[53] Nonetheless, based on an analysis of several comparable, historical groundwater remediation projects, the Cabrera Report postulates a cost ranging from $3.5 million to $13.4 million per site over the course of 20 years, for a total of approximately **$3.24 billion**.[54] It is Plaintiffs' recommendation that an amount of money approximating this figure be held in reserve pending a comprehensive study commissioned by Chevron – a study that its predecessor should have performed many years ago. Plaintiffs should not bear the burden of a potentially multi-million dollar study simply because Texaco did not care to monitor the effect its operations on the environment. The judicial inspection data proves the existence of groundwater contamination; the polluting party should be obligated to bear the costs of designing a proper scope for remediation.

B. CONTEXTUALIZING THE ENVIRONMENTAL CRISIS IN THE EASTERN REGION

The estimates prepared by DCA as well as those contained in the Cabrera Report are at *first sight* clearly reasonable and the product of a sound methodology. But the reasonability of these remediation estimates is even *more* apparent when they are viewed in the context of other large-scale environmental cleanup projects worldwide, including those addressing oil-related disasters and widespread, systemic contamination

[47] Corpus 1299, Folio 139.778.

[48] Corpus 1299, Folio 139.779.

[49] Corpus 1299, Folio 139.780.

[50] Corpus 1431, Folio 152.967.

[51] Corpus 1431, Folio 152.961.

[52] Corpus 1431, Folio 152.961.

[53] Corpus 1431, Folio 152.962.

[54] Corpus 1431, Folio 152.962.

of soils by way of the operation of industry over the course of many years. Conversely, when compared to the costs associated with these worldwide environmental cleanups, the paltry $40 million that Texaco claims to have spent on remediation is laughable – or would be if it were not otherwise so tragic. To wit:

ENVIRONMENTAL CLEANUP PROJECT	SCOPE	CLEAN-UP COSTS[55] *ONLY* (*EXCLUDING* DAMAGES CLAIMS AND OTHER COSTS INCURRED BY THE PARTIES RESPONSIBLE)
TEXACO OIL EXTRACTION OPERATIONS AT THE NAPO CONCESSION, ECUADOR, 1964-1990	**OVER 16 BILLION GALLONS OF TOXIC PRODUCTION WATER SPILLED, IN ADDITION TO OTHER SYSTEMIC CONTAMINATION, AT MORE THAN 300 SITES THROUGHOUT AN AREA COVERING APPROXIMATELY 1,500 SQUARE MILES (CLEANUP DELAYED FOR DECADES)**	**881.3 MILLION TO $5.9 BILLION (ESTIMATED – DCA/CABRERA REPORT)**
DEEPWATER HORIZON (BRITISH PETROLEUM) OIL SPILL, GULF OF MEXICO, USA, 2010	205 MILLION GALLONS SPILLED (CLEANUP BEGAN IMMEDIATELY)	BP ITSELF HAS ESTIMATED THAT CLEANUP ALONE WILL COST UP TO $6 BILLION – A FIGURE THAT SEEMS RATHER LOW CONSIDERING THAT ACTUAL COSTS HAD REACHED $4 BILLION AS EARLY AS JULY 2010.[56] BP HAS ALLOCATED A TOTAL OF $20 BILLION FOR FUTURE CLEANUP COSTS AND OTHER COSTS ASSOCIATED WITH THE SPILL, ALTHOUGH MOST EXPERTS PREDICT THAT BP'S ACTUAL COSTS WILL BE MUCH HIGHER.[57]
PRESTIGE OIL SPILL, COAST OF GALICIA, SPAIN, 2002	20 MILLION GALLONS SPILLED (CLEANUP BEGAN IMMEDIATELY)	$2 TO $3 BILLION IN CLEANUP COSTS (ACTUAL)[58]
EXXON VALDEZ OIL SPILL, VALDEZ ALASKA, 1989	11 MILLION GALLONS SPILLED (CLEANUP BEGAN IMMEDIATELY)	$2.9 BILLION IN CLEANUP COSTS (CURRENT)[59]

[55] All dollar figures from before 2008 have been converted to 2008 dollars using standard consumer price indices.

[56] *BP oil spill clean-up costs could total $6 billion*, THE TELEGRAPH, June 11, 2010, *available at* http://www.telegraph.co.uk/finance/newsbysector/energy/oilandgas/7821462/BP-oil-spill-clean-up-costs-could-total-6bn.html; *BP oil spill clean-up costs rise to $4bn as it plans final kill*, THE TELEGRAPH, July 19, 2010, *available at* http://www.telegraph.co.uk/finance/newsbysector/energy/oilandgas/7897810/BP-oil-spill-clean-up-costs-rise-to-4bn-as-it-plans-final-kill.html.

[57] Kahn, C., *BP's spill costs look manageable 8 months later*, ASSOCIATED PRESS, Dec. 29, 2010, *available at* http://www.msnbc.msn.com/id/40842029/ns/us_news-environment/

[58] International Oil Pollution Compensation Funds, at http://www.iopcfund.org/prestige.htm (updated Jan. 4, 2011); NY TIMES, A Seeping Tanker Turns Spain's Beaches Into an Oily Sandbox, Aug. 31, 2003, *available at* http://query.nytimes.com/gst/fullpage.html?res = 9B07E3D71738F932A0575BC0A9659C8B63&scp = 2&sq = prestige+oil+spill+cost&st = nyt; NY TIMES, World Briefing. Europe: Spain: Effects Of Oil Spill Will Last 10 Years. Aug. 19, 2003, *available at* http://query.nytimes.com/gst/fullpage.html?res = 9E04E5DF1130F93AA2575BC0A9659C8B63&scp = 4&sq = prestige+oil+spill+cost&st = nyt.

[59] Duffield, J. 1997. Nonmarket Valuation and the Courts: The Case of the Exxon Valdez. Contemporary Economic Policy Vol. XV; Exxon Valdez Oil Spill Trustee Council. 2007. History – Details of the Settlement. Available: http://www.evostc.state.ak.us/History/settlement_detail.cfm; LaTourette, S. 2009. Run aground again:

GULF WAR OIL SPILLS, KUWAIT 1991	100 SQUARE MILES (CONTAMINATED FOR SEVERAL YEARS BEFORE CLEANUP)	$2.2 BILLION IN CLEANUP COSTS (CLAIM AMOUNT GRANTED BY UNCC)[60]
ROCKY FLATS NUCLEAR WEAPONS PLANT, COLORADO, USA	25 SQUARE MILES	$7.2 BILLION IN CLEANUP COSTS (ACTUAL)[61]
ROCKY MOUNTAIN ARSENAL, CHEMICAL WEAPONS AND AGRICULTURAL PESTICIDES MANUFACTURING FACILITY, COLORADO, USA	27 SQUARE MILES	$2.7 BILLION IN CLEANUP COSTS (PRIMARILY ACTUAL, WITH SOME PROJECTION INTO THE FUTURE)[62]
HANFORD NUCLEAR RESERVATION, WASHINGTON, USA	560 SQUARE MILES	$53 TO $63 BILLION IN CLEANUP COSTS (ESTIMATED)[63]
FERNALD NUCLEAR SITE, OHIO, USA	1.6 SQUARE MILES	$4.5 BILLION IN CLEANUP COSTS (ACTUAL)[64]

The Exxon Valdez's collision with the Supreme Court's punitive damages jurisprudence. Environmental Law Reporter (39): 11097-11108.

[60] UNCC Governing Council. Report and Recommendations Made by the Panel of Commissioners Concerning the Third Installment of "F4" Claims. United Nations Compensation Committee. S/AC.26/2003/31. December 18, 2003.

[61] Rocky Flats Cleanup Is Declared Complete, NY TIMES, Oct. 14, 2005, *available at* http://www.nytimes.com/2005/10/14/national/14rocky.html (last visited Jan. 19, 2011); DOE. 2005. DOE Certifies Rocky Flats Cleanup "Complete". U.S. Department of Energy. December 8. Available: http://www.energy.gov/news/2790.htm; Rocky Flats Reborn. *SCIENCE*, 317:433. July 27.

[62] DoD. 1996. Final Agreement on Rocky Mountain Arsenal Cleanup Signed. U.S. Department of Defense. June 11. Available: http://www.defenselink.mil/releases/release.aspx?releaseid = 931.

[63] DOE. 2007. Information – Handford Site Map. U.S. Department of Energy, Hanford Site. Available: http://www.hanford.gov/?page = 81&parent = 15. Last updated 2/5/2007; U.S. Water News. 2006. Hanford Plant Cost May Top $10 Billion. February. Available: http://www.uswaternews.com/archives/arcquality/6hanfplan2.html. Accessed 15 May 2008.

[64] Fluor Corporation. Fluor Receives Formal Acceptance from U.S. Department Of Energy; Fernald Clean-Up is Complete. January 29, 2007. Available: http://www.lm.doe.gov/land/sites/oh/fernald_orig/NewsUpdate/pdfs%5CFluor%20Fernald%20Receives%20Formal%20DOE%20Acceptance.pdf. Accessed 15 May 2008.

C. THE CONVENIENCE OF EXTRAPOLATION

As a final note on the issue of remediation, Plaintiffs address Chevron's constant affirmation that in order to carry their burden of proof of contamination, Plaintiffs must sample and present scientific data from *each* of the 916 pits in the Concession area.[65] In the absence of a total inspection, Chevron resorts to its tired trope that the company is somehow being denied due process.[66] Of course Chevron is going to propose such an impracticable and onerous requirement – its primary objective has always been to delay the ruling. If Chevron had its way, the parties would still be performing site visits eight years after commencement of the litigation. Chevron should not be allowed to benefit from the fact that Texaco's contamination was so widespread that a full assessment of every possible location of contaminants would take centuries. The people in the Ecuadorian Amazon cannot afford waiting eight more years while dealing with Chevron's obstructionist tactics in the field, and financing hundreds of redundant inspections, and they should not have to. Indeed, Judge Yánez (who presided over this matter at the time) ostensibly acknowledged this when he held that enough sampling had been performed and that, based on the data already obtained to date, a damages assessment could be performed under the assumption that sites not visited were, on average, as contaminated as the sites examined.[67]

Judge Yánez's decision was righteous and supported by science as well as plain common sense. It would have been prohibitively expensive, time-consuming, duplicative, and scientifically unnecessary for the parties to have sampled each the 360 crude oil wells that Texaco operated in the Napo Concession area during the period of 1964 to 1990. In mass environmental contamination cases such as this one, where contamination is spread over a large area, "representative sampling" or "extrapolation"

[65] *See, e.g.*, Chevron's Petition from 08 October, 2007 at 08h10am, Corpus 1230, Folio 132.897.

[66] Indeed, Chevron seems to have re-invented the notion of what "due process" is during the course of this eight-year litigation. Like a petulant child, Chevron appears to believe that due process is denied *whenever* the Court does not give Chevron what it asks for.

[67] Cite January 22, 2007 at 09h00am, Corpus 1158, Folio 125.657.

is a commonly accepted sampling method.[68] In other words, environmental contamination data from selected sites can be used for drawing reasonable conclusions about *all* sites within an area.

Representative sampling is accepted and recognized in environmental legislation in the United States, a country that has been confronted with numerous instances of widespread contamination.[69] As one U.S. agency commented: "Seldom is an entire site sampled for analysis. There is almost an infinite number of soil samples that could be taken in most situations. Therefore, soil samples that are intended to be 'representative' of a site are [analyzed] and conclusions about that entire site are drawn based on the data obtained from them".[70] In one case involving a former mining site in the U.S., samples were taken from only 160 out of 1,080 possible sampling sites, but a government committee found this sampling to be sufficient, noting "..the large number of samples collected and tested provided information on the location of contaminants and trends in the transport of contaminants and their destination at the basin, especially for surface water".[71] The alternative – sampling each and every possible site of contamination – is impracticable: the limited resources, the impracticalities of wholesale analysis, and the infinite number of potential testing areas within a site, call for the use of sampling in select locations which are then analyzed in order to support conclusions regarding the affected area in its entirety.

The course of events in this trial is entirely consistent with the scientifically valid process of extrapolation. During the trial, over 23% of the wells installed by Texaco and 54% of the production stations constructed by Texaco were sampled (compared to only 15% in the aforementioned American litigation). All together, the wells and stations sampled were representative of the whole. Geographically, samples were taken from sites distributed all across the Concession area.[72] The sites that were sampled produced, on average, a similar volume of

[68] ANSI/ASQC, 1994. *Specifications and Guidelines for Environmental Data Collection and Environmental Technology Programs (E4).* American National Standards Institute (ANSI) and American Society for Quality Control (ASQC, now American Society for Quality).

[69] United States environmental statutes that recognize representative sampling include Federal Insecticide, Fungicide, and Rodenticide Act; the Toxic Substances Control Act; Food, Drug, and Cosmetics Act; and the Occupational Safety and Health Act. In addition to the above, major United States' regulations administered by the U.S. Environmental Projection Agency utilize and depend upon the data results of representative sampling including the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).*See* CHUNLONG ZHANG, FUNDAMENTALS OF ENVIRONMENTAL SAMPLING AND ANALYSIS 35-37 (John Wiley & Sons, Inc, Hoboken, NJ 2007).

[70] *International Atomic Energy Agency*, *Soil Sampling for Environmental Contaminants,* IAEA-TECDOC-1415, at 3 (Oct. 2004); *see also U.S. Environmental Protection Agency, Environmental Response Team, Superfund Program – Representative Sampling Guidance, Vol. 1: Soil,* at 3 (Dec. 1995) ("Analytical results from representative samples reflect the variation in pollutant presence and concentration throughout a site".).

[71] SUPERFUND AND MINING MEGASITES: LESSONS FROM THE COEUR D'ALENE RIVER BASIN, at 114-116.

[72] Corpus 1295 Folio 139316 Cabrera Report (March 2008) Annex G.

oil and formation water at all of the Texaco wells.[73] In terms of topography, the soil types within each field are similar – and samples were taken at *each* of the fields.[74] The average pit size of sampled sites (0.20 hectacres) was representative of the average pit size of all sites (0.21 hectacres).[75] Thus, the sites sampled are representative of all sites in the Concession area. Therefore, the conclusions drawn about the large number of sites visited can be easily and properly extrapolated and applied to the region as a whole. Chevron's rhetoric to the contrary is just that – unsupported *rhetoric* designed to engender doubt where none should exist.

III. REMEDIATION ALONE BARELY BEGINS TO FIX THE ENVIRONMENTAL CRISIS CAUSED BY TEXACO – OTHER FORMS OF REDRESS FOR ENVIRONMENTAL DAMAGE ARE NECESSARY

Although remediation at the Napo Concession will aid in reducing the levels of toxic contaminants saturating the landscape, a cleanup cannot fully restore the Amazonian basin to its former pristine state. The region will undoubtedly bear the scars of decades of Texaco's unscrupulous oil exploitation for generations. In situations like this, where a mere cleanup necessarily falls short of fully rectifying the environmental damage, universal law recognizes the propriety of damages outside the realm of traditional cleanup costs. The aftermath of the Iraqi invasion and occupation of Kuwait in the early 1990s provides a prime example of this principle. After the invasion, numerous countries were saddled with environmental damage stemming from unfettered oil exploration in the geographic region.[76] Not only was a broad swath of the population at risk from exposure to harmful pollutants, but the environment itself was also ravaged with oil and oil-related pollutants caused by spills from pipelines, terminals, and tankers.[77] All totaled, $252 million in environmental damages were obtained.[78]

Although the United Nations recognized that compensation should be aimed at remedial measures, the U.N. commission tasked with addressing this problem expressly provided for non-cleanup damages where there was "sufficient evidence that primary restoration will not fully compensate

[73] Corpus 1295, Folio 139318, Cabrera Report (March 2008), Annex G.

[74] Corpus 1295, Folio 139318, Cabrera Report (March 2008), Annex G.

[75] Corpus 1295, Folio 139318, Cabrera Report (March 2008), Annex G.

[76] United Nations Compensation Commission Governing Council, *Report and Recommendations made by the Panel of Commissioners Concerning the Fifth Installment of "F4" Claims*, S/AC.26/2005/10, June 30, 2005, at 8.

[77] *Id*.

[78] *Id*. at 126.

for any identified losses".[79] In short, redress beyond cleanup is necessary where a cleanup alone cannot fully address the environmental impacts at issue. In this case, additional damages to address environmental impacts are necessary.

The various categories of damages sought by Plaintiffs in this case are not unlike pieces of a puzzle – pieces that, when fit together, can begin to heal the Oriente region and its indigenous populations. Below, in this Section, we discuss two such categories of redress for the environmental crisis caused by Chevron: compensation for damage to the ecosystem and loss of ecosystem benefits, and funding to address the adverse impacts on the way of life of the indigenous persons who rely on the rainforest for every aspect of their culture.[80]

A. COMPENSATION FOR DAMAGE TO THE ECOSYSTEM AND LOSS OF RAINFOREST SERVICES

To be truly effective, the environmental damages in this case must capture the full range of harm done to the precious natural resources of the Amazon basin. Even after removing the toxins from the soil and groundwater, thus neutralizing the acute threat, Chevron's toxic legacy will remain. The Amazon's fragile ecosystem – vital not only to Ecuador but also to the entire world – will remain impacted by Chevron's years of environmental contamination. Correcting this problem is not an easy task. The process of restoring natural habitats is especially "complicated when dealing with old mine wastes or hazardous chemicals which have been absorbed into the soil and are contaminating groundwater and surface water".[81] Chevron must be held accountable for damages beyond the immediate cost of remediating the Concession area – this Court must also award natural resource damages.[82]

1. There is No Question That Natural Resource Damages Occurred and That Chevron Is the Party Responsible for Such Damages

[79] *Id*. at 25.

[80] *See* Corpus 1, Opposite side of Folio 79: Complaint, at VI.2.b-c (constituting a demand for funds to cover a "recuperation plan" for the region, including but not limited to restoration of flora and fauna).

[81] U.S. Fish & Wildlife Service, *The Natural Resource Damage Assessment and Restoration Program*, September 11, 2001, at 2.

[82] Natural resource damages are internationally recognized. In the United States, for example, environmental legislation known as the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") exists for recovering natural resource damages. CERCLA contains a provision titled "Natural Resource Damage Assessment and Restoration" whereby compensation is received directly from the polluter to restore natural resources to their previous undamaged state. U.S. Fish & Wildlife Service, *Beyond Cleanup: Restoring America's Natural Heritage – Facts About Superfund's Natural Resource Damage Assessment and Restoration Program*, at 3-4.

Both the Cabrera Report and the report prepared by Dr. Lawrence W. Barnthouse, entitled *Evaluation of Natural Resource Losses Related to Oil Field Development in the Concession*, submitted by Plaintiffs on September 16, 2010, conclude that the natural resources of the Concession area were substantially impacted by oil extraction operations. Both reports, using internationally accepted science, determine the monetary value of such damage.[83]

To determine whether natural resource damages occurred, Dr. Barnthouse utilized publicly available data from Texaco's own environmental audits performed in 1992 by Fugro-McClelland West, a 1993 audit by HBT AGRA Limited on behalf of the Petroecuador-Texaco Consortium, and data from the trial compiled in the Cabrera Report.[84] These sources reveal major sources of environmental damage – including oil spills, the sprinkling of oil on roads for dust suppression, disposal of chemicals used during drilling, and the discharge of production water. The abundance of data from the site inspections as well as the Fugro-McClelland and HBT AGRA investigations include 1,500 soil samples and 500 water samples in the vicinity of 82 production wells and 12 processing stations.[85] Applying standards promulgated by the United States Environmental Protection Agency ("EPA"), which fully apply to Chevron in the United States, the Cabrera Report determined the Concession Area's threshold for TPH was fully exceeded in 36% of samples collected in the eight oil fields in the Concession Area. Levels for various metals, including barium, copper, chromium and zinc were exceeded in 25%-73% of samples, and similar concentrations were found both inside and outside the disposal pits. These results clearly demonstrate natural resource damage to soils in the Concession Area.[86] That is, the results prove that the oil field soils within the Concession Area are sufficiently contaminated to impair the natural resource benefits provided by terrestrial biota.

In particular, chloride concentrations measured by Fugro-McClelland and HBT AGRA showed significant exceedance of EPA's threshold.[87] In fact, the levels of chloride were approximately *30 times* greater than those allowed by EPA.[88] These results indicate that surface waters in the immediate vicinity of production stations were, at the time of the sampling by Fugro-McClelland in 1992, sufficiently contaminated to impair natural resource benefits as a result of aquatic biota damage in the Concession Area.[89]

[83] Corpus 1967 Folio 206.589 Barnthouse's Economic Criteria, September 2010.

[84] 1967 Folio 206.590-206.593. Barnthouse's Economic Criteria. September 2010

[85] Corpus 1967 Folio 206.590. Barnthouse's Economic Criteria, September 2010.

[86] Corpus 1967 Folio 206591 Barnthouse's Economic Criteria, September 2010.

[87] Corpus 1967 Folio 206.592 Economic Criteria Barnthouse, September 2010.

[88] Corpus 1967 Folio 206.592 Barnthouse's Economic Criteria, September 2010. Annex J, Cabrera Report 2008, Folios 139.524-139546.

[89] Corpus 1967 Folio 206.592 Barnthouse's Economic Criteria, September 2010.

With respect to water resources, Dr. Barnthouse noted that numerous studies indicated that TPH and metal concentrations from streams and rivers throughout the Concession Area exceeded acute or chronic water quality criteria.[90] Based on these findings, it appeared that natural water resources throughout the Concession were damaged. As to groundwater resource samples collected in the vicinity of discharge pits, the Cabrera Report found this was also contaminated with TPH in concentrations exceeding Ecuador's environmental quality criterion, meaning that natural resource benefits from groundwater are also impaired. In sum, the fact that the natural resources were damaged by contamination as evidenced by scientific sampling cannot seriously be in dispute – the Plaintiffs need only rely on data from environmental audits conducted by Texaco itself – Fugro-McClelland and HBT AGRA – to confirm what is already obvious: the rainforest's ecosystem has been substantially impacted.

In addition to evidence of contamination found in the soil and water samples, there is also more tangible evidence of the damages Texaco's operations caused the natural environment in the Napo Concession area. The Cabrera Report estimates that as of 1990, there were 623 hectares of rainforest benefits lost due to the acreage consumed by a pit, a platform, or a station, as well as oil spills and contamination around a pit.[91] 4,300 hectares of rainforest benefits were lost due to road-building because of oil field development (assuming 8 meter-wide roads, with 15 meters on each side being impaired).[92] As Dr. Barnthouse noted, no estimates were available of the geographic extent of groundwater or stream-mile contamination, and thus these figures are conservative in that they do not include any rainforest habitat not physically disturbed by oil field operations but that was contaminated by offsite migration of oils, waste, and production waters. Also, where roads were constructed near rivers and streams, land-clearing and construction activities would have led to erosion of sediments that were probably deposited in stream beds that would have further impaired the ecosystem and natural resources.[93] In light of these factors that would tend to create an underestimated figure, the 623 hectares lost due to pits, platforms, stations, and oil spills and the 4,530 lost due to road construction are credible assessments of the geographic extent of contamination.

2. Determining the Amount of Damages Necessary to Restore the Ecosystem

[90] Corpus 1967 Folio 206.592 Barnthouse's Economic Criteria, September 2010.

[91] For covered pits, rather than deeming their land area lost entirely, Dr. Barnthouse conservatively assumed they provided 25% of intact rainforest. See folio 206.593.

[92] Corpus 1964 Folio 206.593, Barnthouse's Economic Criteria, September 2010.

[93] Corpus 1967 Folio 206.593, Barnthouse's Economic Criteria, September 2010.

The valuation of natural resource damages must account for the loss of natural resource benefits to the public during the interim of the damage. The most commonly used method for determining the monetary value of a lost resource over time is the habitat equivalency analysis ("HEA").[94] The HEA method takes into account the history and duration of the lost resources, as well as time, duration, and effectiveness of future restorative action and natural recovery.

Using HEA and applying a 3% discount rate to all past benefit losses to translate them into present-year values, the Cabrera Report calculated that 3,525 hectares of rainforest need to be restored because of damage caused by oil-related activities, including spills. The Cabrera Report also calculated that 26,446 hectares of rainforest should be restored to compensate natural resource damage caused by road building.[95] The Cabrera Report used two different methods for assessing these losses: (1) the restoration approach; and (2) the willingness-to-pay approach.[96]

The restoration approach estimates the cost per hectare multiplied by the total number of hectares to be restored. The Cabrera Report estimated a per hectare restoration cost of $29,180.[97] The total valuation of 26,446 hectares of rainforest lost is **$874,553,780** (**$102,859,500** for oil-related losses + **$771,694,280** for road-related losses).[98] The restoration approach is the more accurate of the two approaches.[99] Still, as Dr. Barnthouse noted, these values do not account for losses of groundwater and drinking water because data on these topics is lacking, and therefore the restoration approach cannot fully express the lost value of all natural resource damages. That being acknowledged, $874,553,780 is a *conservative* figure for natural resource damages.

The willingness-to-pay approach relies on surveys in which participants estimate the amount of money they would be willing to pay to prevent the destruction of rainforest habitat.[100] Drawing upon the four studies that the Cabrera Report identified, including those performed by Adams et al. (2007), and by Holmes et al. (1998), in Brazil; by Kramer and Mercer in the United States (1997); and by Horton et al. (2003), in the United Kingdom and Italy – the Cabrera Report estimated that on average each person participating in the survey was willing to pay $0.00000509 per hectare to protect tropical rainforest (based on the income per capita in the US).[101] Taking into account countries with a per capita income as high as Brazil, the Cabrera

[94] Corpus 1967 Folio 206.594 Barnthouse's Economic Criteria, September 2010.

[95] Corpus 1967 Folio 206.594 Barnthouse's Economic Criteria, September 2010.

[96] Corpus 1967 Folio 206.594 Barnthouse's Economic Criteria, September 2010.

[97] Corpus 1967 Folio 206.594 Barnthouse's Economic Criteria, September 2010.

[98] Corpus 1967 Folio 206.594 Barnthouse's Economic Criteria, September 2010.

[99] Corpus 1967 Folio 206.599 Barnthouse's Economic Criteria, September 2010.

[100] Corpus 1967 Folio 206.595 Barnthouse's Economic Criteria, September 2010.

[101] Corpus 1967 Folio 206.595 Barnthouse's Economic Criteria, September 2010.

Report estimated a value of $4,735 per hectare lost. Taking into account all countries, the Cabrera Report estimated a value of $7,089 per hectare lost.[102] Using $4,735 to $7,089 as a range in the valuation determination, the Cabrera Report calculated a range of $1.42 billion to $1.697 billion in total natural resource damages.[103] The willingness-to-pay approach considers not only rainforest damage (the only source of natural resource damage considered by the restoration approach) but also damage to ground and surface water. This approach is, however, more difficult to verify as the data points are subjective in nature.[104]

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Based on available data largely collected during environmental audits performed in the 1990s, Dr. Barnthouse found that concentrations of TPH and metals in soil, groundwater, and surface water exceeded levels considered to be toxic to terrestrial and aquatic biota. He further found that concentrations of chloride in production water discharges were high enough to be toxic to aquatic biota for at least several hundred meters downstream from the discharge points. The impact of this toxicity on natural environments cannot be questioned.

Dr. Barnthouse concluded that the number of hectares of rainforest disturbed by well, waste pit, station, and road-building operations could be estimated with some degree of certainty. However, Dr. Barnthouse stated that the Cabrera Report probably *underestimated* the reduction of natural resource benefits due to contamination by Texaco because it no longer took into account the "spatial extent of groundwater contamination or the number of stream-miles that may have been affected by spills or production water discharges" – and that even greater damages are needed to account for Texaco's substandard environmental practices.[105]

As to the economic value of lost natural resources, Dr. Barnthouse noted the difficulty in valuing flood protection, climate regulation, and other services.[106] He did recognize that the approaches used in the Cabrera Report are surrogate methods used in the United States to calculate compensatory damages requirements.[107] Although the restoration cost method was deemed superior by Dr. Barnthouse because it is premised on objective data that can be studied, he repeatedly observed that it did not include costs for restoring groundwater or surface water resources.[108] On the other hand, he suggested that the willingness-to-pay approach could be used for assessing abstract values like climate regulation and absorption of CO_2 but was subjective and presented a challenge to

[102] Corpus 1967 Folio 206.595 Barnthouse's Economic Criteria, September 2010.

[103] Corpus 1967 Folio 206.595, 206.596 Barnthouse's Economic Criteria, September 2010.

[104] Corpus 1967 Folio 206.596 Barnthouse's Economic Criteria, September 2010.

[105] Corpus 1967 Folio 206.596 Barnthouse's Economic Criteria, September 2010.

[106] Corpus 1967 Folio 206.597 Barnthouse's Economic Criteria, September 2010.

[107] Corpus 1967 Folio 206.597 Barnthouse's Economic Criteria, September 2010.

[108] Corpus 1967 Folio 206.597 Barnthouse's Economic Criteria, September 2010.

interpret.[109] Overall, Dr. Barnthouse did not believe that further studies would differ from the range of possible damages fixed by the Cabrera Report.[110] Thus, given the limitations on data collection, Dr. Barnthouse's findings represent the minimal damages that should be awarded, with the restoration approach reaching **$874,553,780** and the willingness-to-pay method yielding a range of **$1.42 billion** to **$1.697 billion** in total natural resource damages. Chevron is to be held accountable for these damages.

B. FUNDING TO REDRESS ADVERSE IMPACT OF RAINFOREST DECIMATION ON INDIGENOUS TRIBES

The Cofán, Secoya, Siona, and Huaraorani villages, indigenous population groups in the eastern Ecuador, have been highly interdependent with their ecosystem since ancient times. As shown in Appendix M to Cabrera's Report (March 2008), although most damage to indigenous communities is irreparable, there is a series of measures in place with a view towards improving living conditions and restoring their traditional ways of life. In addition, Annex G to Plaintiffs' Document of September 16, 2010, prepared by Plaintiffs' legal counsel team identifies potential damages awards for decimation of culture and way of life.

In repairing cultural damage, the objective is to evaluate the harm caused by Texaco to the indigenous tribes, and to determine possible reparation. It is extremely difficult to determine a financial figure for the cultural damage caused, given that it is inestimable.[111] The loss of century-old cultural practices, the loss of identity through ancestral heritage, and the loss of ancestral land cannot be fairly priced on the market. Any attempt to quantify the cultural loss in a monetary sense would fail to capture the damages suffered. Unfortunately, however, these are the only means to compensate and repair the losses, and to stop the extinction of indigenous communities and their ancestral knowledge. It is impossible to put a price on suffering, hunger, freedom, forced displacement, the deterioration of life, beliefs, the fragmentation of territory, and the destruction of roots and identity; however, these types of losses – inestimable – which are most important to recuperate and repair.[112] Chevron may not understand how decimation of a landscape can result in decimation of a people – indeed, it may be asking too much of Chevron and its modern sensibilities to grasp these concepts. But the fact that Chevron's cultural perspective leads it to dismiss this category of damages does not make the suffering of these people less real and does not mitigate the dire need for redress.

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[109] Corpus 1967 Folio 206.597 Barnthouse's Economic Criteria, September 2010.

[110] Corpus 1967 Folio 206.597 Barnthouse's Economic Criteria, September 2010.

111 Robert Snyder, Daniel Williams and George Patterson, *Culture Loss and Sense of Place in Resource Valuation: Economics, Anthropology and Indigenous Cultures*, An Investigation of the Rocky Mountain Research Station, USDA Forest Service, *available at* http://www.fs.fed.us/rm/value/docs/culture_sense_place_resource_valuation.pdf

112 Almeida, A. *et al, Tigre Aguila y Waorani, una sola selva, una sola lucha* [Tigre Aguila and Waorani, one jungle, one struggle]. Acción Ecológica. Acción Ecológica [sic]. Quito, 2008.

1. Background on Cultural Damage Sustained by Texaco's Actions

With Texaco's arrival in the 1960s, the indigenous tribes in Eastern Ecuador were negatively affected. Although there is a lack of previous information about indigenous communities due to their isolation, it is apparent that the groups underwent an overall alteration of their lifestyle. Blasts from seismic studies, helicopter flights, construction of paths, and the introduction of machinery and workers altered their traditional lifestyle. Communities withdrew in fear to protect themselves after being exposed to cucamas ("white people"), different languages, and the disregard for nature, without any previous communication, information, or previous requests for permission. Even prior to the commencement of drilling activities, Texaco would customarily disturb the natural environment by: (1) carrying out seismic tasks along strips several kilometers into the jungle; (2) deforesting areas selected as drilling sites or settlements, with a wide range of affected areas from one hundred thousand to over a million hectares; (3) relocating workers occasionally accompanied by soldiers, heavy equipment, and machinery, etc. into their territory; (4) fragmenting and altering the territory for the settlement of indigenous communities; and (5) causing jungle animals to withdraw and moved away further into the jungle.

The testimony of the Cofán people is illustrative of the indigenous experience. Until the end of the 1960s, the Cofán (were) settled where the Teteye and Orienco rivers flowed into the Aguarico River. According to Prof. Silvio Chapal, "*we, the Cofán, used to live with our families in the estuary of rivers Teteye and Orienco. Suddenly, strangers began to arrive in our lands; they began to fell the forests and some days later the water flowing in the river became totally black, fish started to die and also the animals drinking that water died. This is why the Cofán living in the estuary of rivers Teteye and Orienco had no choice but to leave that place and move to the current District of Cofán Dureno*".[113] Testimonies like this can be found in every surveyed nation. Cofán families that grouped together in the current District of Cofán Dureno to escape the impact of oil-related activities were later forced to move again in the early 1970s when Texaco began to drill the Dureno 01 well there. This experience typifies the indigenous peoples' plight.

The negative psychological impact on the indigenous communities is also well-documented. As discussed in Appendix L to the Cabrera Report, a survey reported upon in that document showed that 54% of respondents suffered hostile behavior by Texaco or its employees. Approximately half of that 54.5%, or 23.02% of the total respondents, claimed to have been subjected to hostile behavior sometimes, and 22.3% reported hostile treatment by Texaco on several occasions or very frequently (12.7% and 9.6%, respectively).[114] Hostile behavior

arose in response to complaints about the destruction of farms, occupation of territory, and the instances where the indigenous as well as the farming population had to live with the presence of

[113] Corpus 1299 Folio 139756. Cabrera Report (March 2008) Annex M.

[114] Corpus 1295 Folio 139639. Cabrera Report (March 2008) Annex L.

company camps. However, it has been noted that hostile attitudes of company workers, employees and executives were more prevalent toward the indigenous population. The data in Appendix L to the Cabrera Report (March 2008) confirm that indigenous peoples reported more frequent hostile treatment.[115]

In addition, discrimination against indigenous groups was rampant during Texaco's work in Ecuador. As reported in Appendix L to the Cabrera Report (March 2008), indigenous focus groups frequently spoke of discriminatory behavior by Texaco's workers, employees, and executives. Such discriminatory behavior included deceitful attitudes, abuse of the communities, and mockery about their clothing or lifestyle. Respondents provided examples such as workers laughing at the residents and manipulating their clothing, lifting their traditional clothes to look at their genitals, etc.[116] This behavior was especially directed toward the children. In the survey, the indigenous in the focus groups mentioned discriminatory attitudes, whereas mestizo groups rarely did.[117]

As expressed through a survey reported in Appendix L to the Cabrera Report, 72.4% of respondents reported suffering the consequences of accidents such as spillage of pits, oil pipelines and –to a lesser extent- seismic shooters and flares. Those accidents often led to water and land contamination. (Appendix L, Cabrera Report, at 89-90 (March 2008).) In addition, the frequent practice of oil-washing roads brought about contamination due to leaching, and the practice of setting fire to crude oil pits generated the spreading of contaminants. Between 81.4% and 95.9% of respondents stated that nature was severely affected by Texaco's oil activities, through contamination of water, deaths of animals, cracked pits or burning of crude oil. Thus, it is manifest that the psychological well-being of the indigenous peoples was negatively impacted by Texaco's operations.

2. Loss of Territory

A fundamental part of the Amazonian cultures is the relationship with the environment surrounding them. Without land, it is impossible for the cultures of the northeastern area to carry on many of their ancestral practices without first recuperating a portion of their ancestral territory. Displacement, as a consequence of pollution and the alteration of the life space, affected the way of life and the culture of the communities very seriously. The arrival of Texaco, the occupation of the jungle by workers and machinery, and the subsequent contamination obliged many of the indigenous people to withdraw from their ancestral lands. Many took flight, out of fear or due to intimidation on the part of the Texaco workers. Others were obliged to move owing to the harmful effects of a petroleum extraction nature, which provided the main source of sustenance of the indigenous peoples. Those who remained were surrounded by settlers, the infrastructure of petroleum extraction, and over 500 km of noisy roads which cross and divide their ancestral lands. For the indigenous people who live on the sustenance provided by the land, ample areas of open country for hunting and fishing are essential. In addition, the cultural consequences of losing valuable land and the access to resources that are fundamental for

[115] Corpus 1295 Folio 139637-139639. Cabrera Report (March 2008) Annex L.

[116] Corpus 1295 Folio 139638. Cabrera Report (March 2008) Annex L.

[117] Corpus 1295 Folio 139638. Cabrera Report (March 2008) Annex L.

nourishment, housing and medicine have had a disastrous effect on the majority of these indigenous people. Before the arrival of Texaco, almost all the members of the indigenous groups located inside the concession lived on ancestral or community lands. At present, less than 25% of the Cofánes and Secoyas, and less than 10% of the Sionas live on community lands, representing a precipitous decline. As that land was divided and the resources depleted, the united communities were obliged to separate. As a result, many traditions have been lost. Repurchasing ancestral territory is the only feasible way of restoring previously-lost ancestral territory to these groups.

3. Loss of Cultural Identity

In the Ecuadorian Oriente, the life of the indigenous peoples has changed drastically in only a few years.[118] The young generations no longer speak the language of their ancestors, nor do they practice their customs and rituals, nor acquire the valuable knowledge of their natural environment that allowed the survival of their ancestors in the tropical forest. Knowledge is lost with the death of the Amazonian elders.[119] The recuperation of the culture does not mean that people must be able to live *exactly* in the same way their forbearers did; that is not feasible. Rather, the goal of cultural recovery is to preserve the ancestral knowledge which still remains, and to avoid the permanent loss of language and cultural practices that have been used for centuries. Ideally, each one of the indigenous nations would have a center for the rescue of ancestral knowledge and practices. These centers should house a collection of the existing publications about the culture, as well as ancestral information and a compilation of the most important practices for each culture. In addition to a primary knowledge center, ideally, there would be small branch centers in the communities, where the teaching of ancestral traditions could occur.

4. Loss of Nutritional Practices

Prior to Texaco's arrival, the Cofánes, Sionas, Secoyas and Huaraoranis lived in a self-sustainable way in their jungle territories by hunting, fishing and foraging; now they are compelled to work and earn money to buy part of their food in the markets.[120] These new practices have brought about an enormous nutritional imbalance in the population. With these changes in food practices resulting from the processes of acculturation

118 Martinez E. *et al*, *Conflictos Socio-Ambientales at el Ecuador y Resistencia at el Ecuador* [Social-Environmental Conflicts in Ecuador and Resistance in Ecuador]. Acción Ecológica. November 2001.

119 Interview with Miguel Angel Cabodevilla (Father Capuchino, has worked with Huaraoranis for several years and has written several publications regarding its culture.

120 Kimerling, J. *Dislocation, Evangelization & Contamination: Amazon Crude and the Huaorani People*, ETHNIC CONFLICT AND GOVERNANCE IN COMPARATIVE PERSPECTIVE 70 (2000).

has come deterioration in nutrition for lack of vitamins and basic components.[121] A plan for recovering nutritional practices would include establishment of breeding operations to promote species of fish and wildlife that were traditional sources of food for the indigenous peoples.

5. Assessment of Cultural Damages

Appendix M to the Cabrera Report (March 2008) recognized that cultural losses cannot easily be quantified, traded in a market, negotiated, or assigned a price. Indeed, this reality means that most of the damage to the indigenous peoples is irreparable and cannot be quantified. Through workshops and study of the affected communities, the Cabrera Report established three focal points in order to determine the level of cultural impact: recovery of territory; recovery of eating habits; and preservation of cultural traditions. Each one of these focal points reflects the damage done, as set forth in the Cabrera Report.

The plan for *recovery of territory* is premised on the notion that each person needs an amount of land large enough to secure their existence, and that those lands are now in the possession of farming communities in lots averaging fifty hectares. The farmers now possessing these lands have largely replaced the forest with farmland and crops for economic value, making this land expensive to re-purchase. Thus, the cost of each hectare would vary according to location, type of soil, access to roads, basic services, crops and consequences of oil-related activities. That being noted, the average price of a hectare of land fluctuates between US $1,500 and US $2,000, depending upon individual negotiations. The Cofán, Huaraorani, Siona, and Secoya Nations intend to recover forty-thousand hectares of land in total. Therefore, the Cabrera Report concluded that because each hectare would cost an average of US $2,000 (which includes the expense of ownership certification), damages in the amount of US **$80,000,000** would be needed to recover part of the ancestral territory of these three ancestral indigenous nations.

The plan for *nutritional recovery* would recognize the infeasibility of restoring for the ancestral indigenous peoples the prevailing situation forty years ago, but would endeavor to carry out actions aimed at restocking rivers and jungle with native species. Aquatic species typical of the rivers of Ecuadorian Amazonia can be bred in pools and then released in certain rivers and marshes identified as unspoiled. Breeding facilities built in the natural jungle for certain kinds of mammals would also help restore the traditional eating habits of those indigenous peoples. Breeding facilities would need to be situated in places with favorable land slope, proximity to community, and availability of water sources. Once these sites are evaluated, the breeding enclosures would be located and built, consisting of five enclosures for the areas containing feeding and watering troughs, shelters and a chute. Breeding facilities would also be constructed for species unique to that region, as well as pools for breeding fish. Each species requires its own food plan, habitat, and handling guidelines. For this plan to succeed by securing each species'

121 See Fundacion Natura, 1996 and Behren, 1984.

reproduction pattern, it would be necessary to guarantee monitoring, feeding and handling at each facility for at least 10 years. Also, the plan would need to be replicated in at least 80 indigenous communities. Accordingly, the estimated cost of each breeding facility would be US $400,000 annually and the cost for the implementation of the whole breeding plan would amount to about **US $320,000,000**.

In order to achieve the *preservation of cultural traditions*, a plan would be needed to recover each indigenous person's identity, health, traditional medicine and traditional education. As outlined in the Cabrera Report, the most feasible alternative is the creation of a center of indigenous education aimed at strengthening each nation. The centers would be open to the whole community but mainly directed at children to propagate the culture for future generations. Necessary steps would include constructing the center, supplying it with equipment, and providing maintenance, operations and administration. Other costs would include the students' accommodation, feeding and transportation expenses. Although one center for each community would be most effective, a more efficient alternative would be a central institution with four areas, one for each indigenous nation. The center's actual operation would cost an average of US $250,000 per month, amounting to US $3,000,000 annually. The Cabrera Report predicted that stronger cultural consciousness and identity could be accomplished within 10 years, at a total approximate cost of **US $30,000,000**.

As concluded by the Cabrera Report, the total cost of the actions described above is US **$430,000,000**.

Annex G to Plaintiffs' statement of September 16, 2010, proposed economic assessment criteria for repairing damages caused to the cultures due to hydrocarbon related activities in the Napo Concession Area from two quantifiable perspectives.

The first aspect proposed for repair corresponds to the cost of culture preservation, which is the price of implementing measures to avoid extinction of certain cultural practices. In this case, we consider constructing an integral system of rescue centers for ancestral awareness and practices (main center with branch centers), the cost of an integral education program, and the preservation, study and recovery of the language. The approximate cost of constructing and maintaining the integral system of rescue and cultural practices centers is **$56,500,000**. The cost of the plan for the recovery, preservation and study of the four languages in the Concession zone and its maintenance would be at least **$10,000,000**. Also, there would be an integral education program developed, which is expected to cost **$15,000,000**.

The second aspect used to propose costs is the amount needed to mitigate certain changes which were caused by the petroleum company that severely impacted the culture and does not allow for normal ancestral practices. Among these, one considers territory and food. To mitigate territorial displacement caused by the petroleum activity, it was calculated that two hundred thousand hectares of land must be purchased. This equals **$400,000,000**. The total monetary cost, which should be granted for repair and damages incurred to the indigenous population is **$481,500,000**.

6. Chevron's Predictably Cynical Take on Cultural Impact

In his October 1, 2010 report, Chevron's expert, Dr. Robert Wasserstrom, asserts that "[t]here is no scientific or historical basis for the assertions presented in the plaintiffs' report". (Wasserstrom Report, at 2.) Merely because Chevron is dismissive of the plight of indigenous cultures does not mean that such plight is baseless. Generally, denial of a group's supportable articulations of its own cultural experience is shown little tolerance in modern society, especially with respect to oppressed groups. Chevron's matter-of-fact position – that the Cofán, Huaraorani, Siona, and Secoya peoples *have not* been harmed—betrays serious racist undertones in its policies. In this instance, Chevron appears to have calculated that these indigenous groups have little political or societal power, such that mocking their history will go relatively unnoticed. Chevron is wrong.

As part of an argument that essentially admits Chevron's wrongful disregard for the Cofán, Huaraorani, Siona, and Secoya peoples' rights, Dr. Wasserstrom argues that "[t]he Ecuadorian Government Also Ignored Indigenous Territorial Rights". (*See* Wasserstrom Report, at 9-10.) In support, Chevron boasts that it spent US $55,000,000 to "buil[d] a highway from Quito to Lago Agrio" and "secondary roads not related to oil exploration" under its contract with Ecuador. This argument, of course, is entirely consistent with to Chevron's oft-repeated and rather child-like "defense" throughout this trial: "but the Government of Ecuador did it too". Whether or not some other entity has at times acted without due care toward indigenous culture has absolutely no bearing on whether Chevron should be made to account for the damages that *Chevron* has inflicted on these people. Once again, finger-pointing is not a defense.

IV. DISGORGEMENT OF UNJUST PROFITS

In its rush to exploit Ecuador's natural resources, Texaco employed substandard remediation practices – practices which severely impacted indigenous land and culture, and which left behind unmitigated pollution. The company failed to perform standard environmental protection practices: Texaco did not re-inject Formation Water, did not remediate oilfield pits, and did not capture natural gas. Texaco decided not to employ these standard practices for its own economic benefit: As alleged in Plaintiffs' Complaint in 2003, by spending less money on remediation, the company ensured profits were maximized and an enormous financial gain was realized.[122]

The company further acted in a concerted way to conceal the damage it caused so as to avoid detection – its executives ordered spill records not be kept or destroyed, and it ignored internal audits which suggested massive contamination had occurred.[123] When litigation began, the company sought to avoid prosecution and liability by removing its assets from Ecuador. The company then aggressively contested jurisdiction when the lawsuit was first brought in the United States. When the case was re-venued here in Ecuador, Chevron attempted to stall this trial

[122] Corpus 1, Reverse Folio 77, Claim at IV.5 ("polluting practices were cheaper, such that Texaco preferred to degrade the environment before decreasing their resources.")

[123] See page 23 and 41 of the 1st part of the Alegato, from 17 January, 2011.

at every turn with its repetitive motion practice, interference with the judicial inspection process, and filing of thousands of duplicative pages of "evidence".

The result: for years, Chevron has benefitted by avoiding disposal costs, subsequent investigation, and cleanup costs. As a consequence, Chevron now enjoys in its corporate coffers the windfall of profits that Texaco's substandard practices created decades ago. It would be unfair and unjust to allow Chevron to continue to retain the profits the company earned in the Napo Concession area – profits earned because the company employed substandard remediation practices.

Chevron should be required to account for its profits and give back those profits in the form of a civil penalty, so as to return the company to a position it would have been in had it complied and remediated the Napo Concession area in a timely manner. The company should not be rewarded, in the form of handsome historic profits, for its purposeful efforts to obstruct and delay remediation efforts for the very pollution it caused. Indeed, if a company knows that it can make, hypothetically, *$100 billion* in extra profit by breaking environmental laws and estimates that, even if caught, it would be able to retain this extra profit and would only have to pay *$10 billion* in remediation, that company will choose to break the law 100% of the time. This would be an untenable framework – companies must not be incentivized to pollute.

Fortunately, Ecuadorian law and universal principles of justice offer this Court a remedy to require Chevron to repay and return to Ecuador the ill-gotten profits at issue in the form of "unjust enrichment" damages. Unjust enrichment damages, recognized as proper by the Supreme Court of Ecuador, are employed to prevent one party from profiting unjustly at the expense of another. A person who profits at the expense of another is required to make restitution to the other. In pollution cases, unjust enrichment allows for the shifting of the cost of pollution back to polluters who engage in high-risk environmental activities in sensitive eco-systems, who refuse to employ standard environmental protection practices, and who refuse to clean up resulting pollution quickly. Unjust enrichment also has a deterrent effect which coincides with the Amazonian peoples' desire to protect their land. Damages in the form of unjust enrichment here would bring responsibility to bear on Chevron, thereby encouraging other international corporations to consider the effects of future projects on the Amazonian rainforest and its peoples and to consult with local residents before proceeding with those projects in a way hazardous to our natural resources.

Unjust enrichment is different from the other categories of damages sought by Plaintiffs and discussed herein. While the other damage categories address the corrective actions needed to remediate Chevron's toxic legacy in Ecuador, unjust enrichment aims to disgorge benefits that it would be unjust for Chevron to keep. In other words, the unjust enrichment calculation is not a function of the amount of damage caused, but rather, it is a function of how much the company benefited in the process of causing that damage.

A. THIS COURT HAS THE AUTHORITY TO AWARD UNJUST ENRICHMENT DAMAGES UNDER ECUADORIAN LAW AND PRINCIPLES OF UNIVERSAL LAW

For decades, Texaco (and later Chevron) have argued that unjust enrichment is not an available remedy in Ecuador – that the company should be entitled to retain the profits it generated for the decades it operated in the Concession area, even despite its substandard environmental practices and record of contamination. This argument is as wrong as it is unjust.

Disgorgement of ill-gotten profits is a universally recognized principle of fairness, recognized in countries throughout South America and the world. It is a theory of damages that the Supreme Court of Ecuador has recognized, and the Civil Code of Ecuador allows. It is a theory that this Court should apply ensure that Chevron does not retain its profit for its historic wrongdoing.

1. Unjust Enrichment Is a Category of Damages Recognized Across South America and Around the World as a Matter of Fairness and Universal Law

Disgorgement of profits is an accepted approach to prevent unjust enrichment. Disgorgement is designed to deprive the wrongdoer of all ill-gotten gains flowing from the defendant's wrongful conduct. It is a concept internationally recognized and that has its roots in international law, appearing universally across North American law,[124] European law, and South American law.

In modern law, the principle that no one can be enriched unjustly at the expense of another has been enshrined in the German Civil Code (Articles 812 and subsequent),[125] the Swiss Code of Obligations (Article 62 and subsequent),[126] Italian Civil Code (Article 2041 and subsequent),[127] Japanese Civil Code (Article 703 and subsequent) and the Portuguese Civil Code (Article 473 and subsequent). In most modern codes, like the New Dutch Civil Code banned in 1992, the principle of unjust enrichment has been explicitly incorporated.[128]

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[124] *See, e.g.*, *Janigan v. Taylor*, 344 F.2d 781 (U.S. 1st Cir. 1965) ("Unjust enrichment can occur when a defendant uses something belonging to the Plaintiff in such a way as to effectuate some kind of savings which results in or amounts to a business profit. . . . Defendant[s] used Plaintiffs' property to dispose of pollutants and saved the expenses of otherwise collecting a disposing of same".).

[125] German Civil Code, Article 812 ("A person that by a loan or another way, unjustifiably obtains something, and at the expense of another person, is obligated to compensate the other person. Said obligation shall exist even if the legal cause existent at the beginning, it later disappears, or even if the pursued result regarding the legal action through the loan does not go through.").

[126] Swiss Code of the Obligations and Contracts, Article 62 ("A person who has been unjustifiably enriched at the expense of another, is obligated to compensate the other person. The compensation is due specifically by the person receiving something without a valid cause, by virtue of a cause that did not happen, or a cause that stopped existing.").

[127] Italian Civil Code, Article 2041 ("A person who has been unjustifiably enriched at the expense of another must, within the limits of the enrichment, compensate for the correlated patrimonial reduction.").

[128] See Arthur S. Hartkamp, Unjust Enrichment Alongside Contracts and Torts, in Unjust Enrichment and the Law of Contract 15 (ed. By E.J.H. Schrage, Kluwer, 2001), with reference to Article 6:212(1) *("A person who has been unjustifiably enriched at the expense of another must, to the extent this is reasonable, make compensation for the damage suffered by that other person up to the amount of his enrichment").*

In Latin America, the principle of unjust enrichment explicitly appears in many national civil codes: In the Civil Code for Mexico City (Art. 1882 and subsequent), Venezuelan Civil Code (Art. 1183 and subsequent), Peruvian Civil Code (Art. 1954-55), Paraguayan Civil Code (Art. 1817 and subsequent) and the Brazilian Civil Code (Art. 884-886).

Thus, the Book IV, Title I, Chapter III of the Mexican Civil Code (for Mexico City), under the title of "Enriquecimiento Ilegítimo¨, (Unjust Enrichment) establishes in its Article 1882: *Who is enriched without cause at the expense of other, is obligated to compensate him of his impoverishment in the extent that he was enriched."* Article 1184 of the Venezuelan Civil Code formulates the same principle: *A person who has enriched at the expense of other, is obligated to compensate the other person within the limits of his enrichment, for all of his impoverishment."* Similarly, Article 1954 of the Peruvian Civil Code (Book IV, Section IV) expresses: *"A person who illegally enriches at the expense of another person should compensate him."*

In other Latin American countries that adopted civil codes in the second half of the nineteenth century (similar to Ecuador), as in the case of the Chilean Civil Code (1855) and the Argentinean Civil Code (1872), the principle of unjust enrichment was not explicitly adopted . Numerous applications in various articles of these codes, however, make clear that the general principle of unjust enrichment is an accepted doctrine and form of damages.[129] It is simply not surprising, then, that one legal commentator studying Latin American legal systems concluded that, whether or not explicitly adopted in Civil Codes, "unjust enrichment, or enrichment without cause, is generally viewed throughout Latin America as one of the four basic sources of obligations (along with tort, contract and the law)."[130]

2. The Ecuadorian Civil Code Allows for an Unjust Enrichment Remedy as a Principle of Universal Law, and Ecuadorian Courts Have in the Past Awarded Unjust Enrichment Damages

The concept that "one may not become richer at the expense of another" is embodied in the Ecuadorian Constitution, the Civil and Commercial Codes, and court precedents. It is a concept embraced by prominent Ecuadorian legal scholars. This Court has the authority, and should not hesitate, to apply the principle here to disgorge Chevron's ill-gotten gains from its years of substandard environmental practices.

The Ecuadorian doctrine, according to Luis Parraguez Ruiz, understands by "unjust enrichment" the situation arises when "*a person obtains an unfair patrimonial benefit, in other words, without a reason to justify it, with prejudice or detriment of patrimony to other person, who is entitled to the remedies to restablish the affected patrimonial balance*".[131] Similarly,

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[129] *See generally* Robert C. Casad, *Unjust Enrichment in Argentina: Common Law in a Civil Law System*, 22 AM. J. OF COMP. L. 757 (1974).

[130] Robert C. Casad, *Unjust Enrichment in Argentina: Common Law in a Civil Law System*, 22 AM. J. OF COMP. L. 757, 783 (1974).

[131] Luis S. Parraguez Ruiz, El enriquecimiento sin causa, at Manual de Negocio Jurídico, Apuntes of the Cátedra of the Curso "Negocio Jurídico", Colegio de Jurisprudencia, Universidad San Francisco de Quito.

Alfonso Oramas Gross expresses that the unjust enrichment occurs "*when there is a displacement of value from one patrimony to another, caused externally in accordance with the objective law, in other words, without violating or adapting to a positive legal rule and without a legitimate cause that may be called.*"[132]

After examining the "modern principles of law", Professor Adolfo Pérez Guerro confirmed that among the many universal principles adopted by Ecuadorian legislation, Ecuador has firmly adopted the "prohibition of enrichment without cause".[133] The Ecuadorian Civil Code contains many examples of provisions allowing a plaintiff to recover unfairly received profits.[134] The Ecuadorian courts, moreover, have regularly recognized a right of recovery under the unjust enrichment principle.[135]

That there may be no provision specifically governing a plaintiff seeking return of profits for substandard environmental practices in connection with natural resource extraction is not surprising. Ecuadorian legislation has applied the notion of unjust enrichment in several specific ways because, as with any doctrine, the legislature cannot and need not envision each and every circumstance where a company might unjustly and unfairly profit in the course of all business and legal relations. As two Chilean legal scholars, Professors Arturo Alesandri Rodriguez and Manuel Somarriva, have observed, unjust enrichment may be applied even in the absence of a directly controlling Civil Code provision:

> 1230. – *Enrichment without cause in default of an express provision*. The first question presented regarding this doctrine is whether we could under our laws apply unjust enrichment even if we do not have a specific legal text; because if the Code specifically establishes it, there is no doubt, it is applicable. The affirmative answer seems certain because just from the circumstance that our legislator has not established a general provision, we cannot conclude that he has not accepted the principle; on the contrary, there are so many provisions that apply the principle that we do not

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[132] Alfonso Oramas Gross, Enriquecimiento sin causa como fuente de obligaciones, ed. Edino, Gauayquil, 1988, p. 71 ("Oramas Gross, Enriquecimiento sin causa"), citado at la causa "Andrea Victoria Salinas Alvarado v. Eusebio Maneul Cansing Carriòn, Supreme Court of Justice, First Civil and Comercial Chamber, 30 May 2001, Gaceta Judicial, Year 103, Series 17, No. 10, p. 2996 ("*Salinas Alvarado v. Cansing Carrión*").

[133] Adolofo Perez Guerro, FUNDAMENTOS OF THE DERECHO CIVIL ECUATORIANO, Quito, 1940, pages 39-40.

[134] There are rules in the Ecuadorian legal system that establishes the principle of unjust enrichment, as an example we are indicating a few of the cases and articles in the Civil Code having this principle (Articles 147, 171 division 3, 172, 176, 177, 178 and 179), Obligation of the main owner to reimburse the value of the necessary work for the conservation of the usufructuary issue (Art. 811), Nullity of the actions of the unable (Art. 1705), Obligation of the Mandator (Art. 2065), Obligation of a Shareholder in the name of a Corporation, but without sufficient power (Article 1998), Deposit made to a disabled depository (2113), Crimes and quasi delicts (Article 2216), Payment made by a third party against the will of the debtor (Article 1590). Source: Enriquecimiento sin causa como fuente de obligaciones (Oramas, 1988).

135 Some of the sentences in which the Ecuadorian Court has applied the principle of unjust enrichment are: Vignolo v Varas Otoya, (Legal Gazette), year XXXVII. Serial V. Number 161. Page 3986. (Quito, May 12, 1939)). Valladares Chipanitza v Muentes Avila et al. (File 391, Official Record 205, (November 16, 2000),), Salinas Alvarado V Cansing Carrión (Legal Gazette) Year CIII, Serial XVII. No. 10. Page 2996. (Quito, May 30, 2002)), Berrazueta v Eng. Loyola Espinoza, et al. (Legal Gazette. Year XCII. Serial XV. No. 13. Page 3933. (Quito, October 22, 1991)), Vargas-Valderrama v. Nuques (Legal Gazette. Year CV. Serial XVIII. No. 1. Page 146. (Quito, November 16, 2004)).

> think we are mistaken when we affirm that it would be perfectly legal to establish and apply in a broad way this principle even though there is no legal text.[136]

This is because the Civil Code provisions, in fact, give this Court authority to grant unjust enrichment damages as part of the Court's obligation to ensure justice is served.[137] In 2000, the Supreme Court of Justice, in recognizing a Cassation ruling, Valencia Zea stated that the modern doctrine shows "that the principle of unjust enrichment is a general source of obligations. Thus the interpretation must extend empirical solutions to all other cases of enrichment not expressly stated in the Law."[138] The Judgment continues by noting "Article 18(7) of the Ecuadorian Civil Code states that 'in the absence of law, the principles of Universal Law will be applied.' And justly the principle of enrichment without cause is the prohibition from receiving unjust enrichment at the expense of another, and is recognized by Law. For this reason, it is possible to use the application of principle of enrichment without cause in unlegislated cases and in spite of not having stated the principle firmly and specifically."[139]

B. CHEVRON SHOULD BE FORECLOSED FROM ARGUING THAT UNJUST ENRICHMENT IS NOT AN AVAILABLE REMEDY IN ECUADOR BECAUSE IT HAS MADE THAT ARGUMENT BEFORE AND LOST: AT LEAST ONE COURT HAS FOUND THAT, UNDER ECUADOR LAW, TEXACO MAY BE HELD LIABLE FOR UNJUST ENRICHMENT DAMAGES

Chevron has repeatedly submitted to this Court decisions and other "evidence" from the United States in support of its claims. The company has repeatedly argued that this court should look to United States court decisions and the findings by United States judges for guidance in forming its decisions here.

The fact is that Texaco has previously argued that unjust enrichment is not an available remedy in Ecuador – and Texaco *lost* this argument. In 1983, Texaco was the defendant in a United States lawsuit over a dispute between it and another oil company, Phoenix Canada Oil

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[136] Arturo Alesandri Rodriguez and Manuel Somarriva,, Curso de Derecho Civil, volume 4, page 806, Paragraph 1230. This is especially persuasive because, as this Court knows, the Ecuadorian Civil Code of 1861 was a close replica of the Chilean Civil Code of 1855 which has served as a model for almost all later Latin American codes.

[137] First, Article 18 of the Civil Code provides that "judges cannot suspend or deny the administration of justice because of obscurity or gap in the law." Second, Paragraphs 1 through 6 of Article 18 of the Civil Code contain guides to decision when the Code article or statute is "obscure." Finally, the Civil Code expressly allows judges to apply principles of universal law and justice in decision-making and in the awarding of damages. Paragraph 7, which applies in the absence of an applicable provision, allows judges to fill in gaps in their performance of justice: "In the absence of specific provisions of law, those laws which exist covering analogous situations shall be applied; and in the absence thereof, recourse shall be made to principles of universal law." Article 274 of the Ecuadorian Code of Civil Procedure, moreover, provides that "in judgments and orders the issues to be adjudicated shall be decided with clarity on the basis of Law and the merits of the case; and in the absence of Law, on the basis of principles of universal justice."

[138] CSJ. Judgment No. 273 – 2000. Case of Terán Narváez versus Narváez Rosero, June 28, 2000. Published in R.O. No. 134 dated August 3, 2000.

[139] CSJ. Judgment No. 273 – 2000. Case of Terán Narváez versus Narváez Rosero, June 28, 2000. Published in R.O. No. 134 dated August 3, 2000.

Company ("Phoenix Canada"), regarding the payment of royalty rights for a project based in Ecuador. The United States court found that the laws of Ecuador controlled the trial *(and not United States law)* because the dispute arose out of Ecuador. Under Ecuadorian law, Phoenix Canada sought unjust enrichment as a penalty to disgorge Texaco's illegal profits. Texaco argued that an unjust enrichment award was inappropriate because Ecuador did not recognize an unjust enrichment remedy and therefore Phoenix Canada could not prevail on this theory. Over Texaco's objections, however, the United States Court studied Ecuadorian law and found "overwhelming scholarly support for the position that Ecuador would recognize a general cause of action for unjust enrichment (as have other civil law jurisdictions and, in particular, neighboring Chile)."[140] The Court found support for this theory even where (as Chevron now argues in this litigation) there was no single Civil Code provision specifically authorizing an unjust enrichment remedy:

> The absence of a specific code provision has little bearing when general principles and interpretation indicate recognition of the theory and these latter embodiments of Ecuadorian law remain unchallenged. Even though a fundamental premise of civil law systems considers law or remedy making by the judiciary an anathema, civil law courts, nonetheless, often fill the interstices of civil codes by recourse to general principles or "customary" principles. The Court finds that a reasonable basis exists to conclude that Ecuadorian law recognizes the concept of unjust enrichment.[141]

The Court's opinion was based at least in part on affidavits submitted by prominent practitioners and scholars of Ecuadorian law. The United States court both relied on and accepted an Affidavit by René Bustamante Muñoz of the firm Pérez, Bustamante y Pérez in Quito.[142] Dr. Bustamante – who once taught classes on the Civil Code at the Law School of the Catholic University of Ecuador – broadly concluded that:

> [T]he doctrine of the juridical principle of unjust enrichment, enrichment without cause, illegitimate enrichment or enrichment at the expense of another party, has been accepted in our Constitution, in our Civil and Commercial Legislation, in the precedents and in the juridical doctrines construed on the bases of our positive laws, or the positive laws of other countries, like Chile, Colombia , Mexico, Spain, France, etc., identical or similar to the Ecuadorean legal texts.[143]

Dr. Bustamante's legal opinion was consistent with the conclusions reached by Henry P. De Vries – the Professor Emeritus of Comparative Law and Director of the Inter-American Law Center at Columbia University School of Law – who has extensively studied "the contemporary legal system of the Republic of Ecuador."[144] Professor De Vries concluded that "[a]n Ecuadorian court, faced with a claim for restitution in a case of unjust enrichment, would be obliged to decide the case. . . . and the applicable guides to decisions would be found among 'the principles

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[140] Phoenix Canada Oil Co. Ltd. v. Texaco, Inc., No. 76-421-MMS, 1984 WL 5409, at *1 n.12 (U.S. D. Del. July 20, 1984).

[141] *Phoenix Canada Oil Co. Ltd. v. Texaco Inc.*, 560 F. Supp. 1372, 1384 (U.S. D. Del. 1983).

[142] Statement of the jurist René Bustamente Muñoz.

[143] Affadavit of René Bustamante Muñoz, 21 July 1982, Page 8.

[144] Affadavit of Henry P. De Vries, 20 September, 1983. Paragraph 3.

of universal law (Article 18, par. 7 of the Civil Code) or the principles of universal justice' (Article 294 of the Code of Civil Procedure)."[145] Because the principles of universal law or universal justice "requires that restitution be made in cases of unjust enrichment, and thus constitutes a direct source of guidance in an Ecuadorian court", Ecuadorian law recognizes a cause of action for unjust enrichment.[146] The American court also considered the opinions of Dr. Rubens Medina, the chief of the Hispanic Law Division of the United States Library of Congress who, after citing to multiple cases decided by the Supreme Court of Justice, opined that "[t]he presence and significance of the concept [of unjust enrichment] within the context of Ecuadorean law is therefore indisputable."[147] It is no wonder the American court rejected Texaco's arguments and concluded that civil unjust enrichment damages exist in Ecuador – it is, after all, "indisputable" (in Dr. Medina's words) that such civil damages are available here in Ecuador.

In sum, Chevron has repeatedly thrust upon this Court decisions and other "evidence" from United States courts. As such, this Court should consider that a United States court sitting in judgment of Texaco and studying Ecuadorian law concluded that unjust enrichment is an available form of damages here in Ecuador.

C. THE PROPOSED UNJUST ENRICHMENT DAMAGES ARE REASONABLE AND WOULD CAUSE CHEVRON TO ACCOUNT FOR THE ILL-GOTTEN PROFITS IT RECEIVED

Both the Cabrera Report and the report prepared by Jonathan Shefftz, a financial economist in the United States who has developed economic models and analysis for the United States government, detail how Chevron benefited in the form of significant improper economic gains by disregarding globally accepted environmental standards for decades, and then by using the money it saved to invest in other businesses.

1. The Costs That Texaco Avoided By Employing Substandard Remediation Practices

The Cabrera Report presents an estimate of the monetary saving and benefits realized by Chevron as a result of failing to properly treat and dispose of oil exploration and production wastes and by-products.[148] The report identifies three substandard practices employed by Texaco in effort to save itself money and maximize profit: (1) the company discharged production water into rivers and streams; (2) the company openly flared gases; and (3) the wastes produced at wells were placed into unlined pits that did not fully contain the wastes.[149]

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[145] Affadavit of Henry P. De Vries, 20 September, 1983. Paragraph 23.

[146] Affadavit of Henry P. De Vries, 20 September, 1983. Paragraph 24.

[147] Affadavit of Rubens Medina, Head of the Division of Hispanic Law, Legal Library of the US Library of Congress. 25 October, 1983.

[148] Corpus 1301 Folio 139.981. Cabrera Report (March 2008) Annex T.

[149] Corpus 1301 Folio 139981. Cabrera Report (March 2008) Annex T.

(a) *Failure To Re-inject Formation Water*

The American Petroleum Institute recommended in 1962 that the proper way to handle production water (which is contaminated with hydrocarbons) is to re-inject the water using injections wells.[150] Texaco did not re-inject Formation Water. As a result, in the period from 1972 to 1990, 379,246,100 barrels of Formation Water were produced by Texaco.[151] Had Texaco re-injected the Formation Water as the industry standard required, this process would have cost Texaco $0.81 per barrel, or **$307,189,341**, as documented in the Cabrera Report.[152]

(b) *Failure to Capture Gases*

If Texaco had captured, rather than burned (also known as "flaring") the gas it produced from wells, a large amount of toxic hydrocarbons would not have been released into the air.[153] Texaco, instead, routinely and regularly flared gas with disregard for the surrounding lands and its residents. PetroEcuador records reveal that Texaco produced 230,464,948 cubic feet of gas.[154] The cost to capture, rather than flare, each unit of gas is $0.00171 per million cubic feet of gas. The Cabrera Report thus calculates the total cost avoided by Texaco in this category as **$410,227,607**.[155]

(c) *Placement of Well Wastes in Unlined Pits*

Oil extraction operations involve the production of well wastes, such a mud and fluids which are contaminated with hydrocarbons or production water. Standard practice dictates that well wastes are to be disposed of safely at the well site or at off-site central processing facilities.[156] A properly constructed waste pit prevents further contamination, as it is constructed to prevent waste materials from spilling out and contaminating surrounding soil and groundwater.[157] Texaco's own audit report reveals that the company used open pits only 1-2 meters in depth, and lacking clay or synthetic liners that would prevent contaminants from

[150] American Petroleum Institute, 1962. Primer of Oil and Gas Production. 2nd ed.

[151] Corpus Corpus 1301 Folio 139981. Cabrera Report (March 2008) Annex T. (citing the Woodward-Clyde International Report (2000) and documentation from Petroecuador).

[152] Corpus Corpus 1301 Folio 139984. Cabrera Report (March 2008) Annex T.

[153] Corpus Corpus 1301 Folio 139983. Cabrera Report (March 2008) Annex T (citing M. Strosher. 1996 Investigations of Flare Gas Emissions in Alberta. Alberta Research Counsel. Final Report to Environment Canada, Alberta Energy and Utilities Board, and the Canadian Association of Petroleum Producers).

[154] Corpus Corpus 1301 Folio 139986. Cabrera Report (March 2008) Annex T (haciendo referencia a los datos de PetroEcuador).

[155] Corpus Corpus 1301 Folio 139986. Cabrera Report (March 2008) Annex T.

[156] Corpus Corpus 1301 Folio 139982. Cabrera Report (March 2008) Annex T (citing Drilling Waste Management Information System. 2008. Fact Sheet – Commercial Disposal Facilities.

[157] Corpus Corpus 1301 Folio 139982. Cabrera Report (March 2008) Annex T.

leaching into the soil and groundwater.[158] The Cabrera Report, using commonly accepted figures, calculates that it would have cost Chevron $70.48 per cubic meter to properly dispose of the well wastes in a fashion that would likely not have contaminated surrounding soil and groundwater. Assuming the existence of 917 waste pits covering a total area of 768,016 square meters), the total cost Chevron would have accrued is **$162,389,348** (2008 U.S. dollars).[159]

Thus, had Texaco in the time it operated in the Napo Concession area used standard environmental controls to minimize contamination and pollution, the total cost to the company would have been **$879,806,296**. However, this figure, by itself, does not account for the fact that Chevron has been able to use this savings over time to invest in other businesses and technology. Based on exchange rates and Chevron's expected profit values, and employing a commonly-accepted method known as Weighted Average Cost of Capital ("WACC"), the Cabrera Report concluded that actual amount of Chevron's unjust enrichment was actually **$8,310,000,000**.[160]

As part of the Plaintiffs' September 16, 2010 submission, economist Jonathan Shefftz performed his own unjust enrichment analysis, also using a WACC approach, and concluded that Chevron's avoided costs could range from **$4,565,733,630** to **$9,463,786,552**.[161] The $9,463,786,552 figure assumes that Chevron paid no taxes on any of its profits from the Napo Concession area. In contrast, the lower, $4,565,733,630 figure assumes that Chevron paid a high federal and state combined tax rate in the United States (which is unlikely given Chevron's creation of multiple companies and subsidiaries to minimize tax liability). In either case, the avoided costs are staggering: The lucrative nature of the oil extraction operations in the Napo Concession area drove Chevron into Ecuador in the first instance, and the company profited richly, in part because of the decisions it made to abandon standard environmental protection practices.

Chevron has argued – in an effort to mislead this Court – that by seeking unjust enrichment damages, Plaintiffs are effectively seeking a "double penalty." This assertion rests on a fundamental misconception of what unjust enrichment really is. Even if Chevron is ordered to pay other damages, as detailed in this submission, it cannot be considered a "double penalty" to require Chevron to also pay a civil penalty under a theory of unjust enrichment. Unjust enrichment addresses the avoided costs of compliance and due care, and the time value of money Texaco elected *not* to invest in standard environmental practices. Chevron should be made to pay, on the one hand, the cost to remediate the Napo Concession and, on the other hand, should pay a penalty for profiting off the contamination in order to deter future misconduct by Chevron

[158] Corpus Corpus 1301 Folio 139982. Cabrera Report (March 2008) Annex T (citing the report of Woodward-Clyde International (2000).

[159] Corpus 1301 Folio 139988. Cabrera Report (March 2008) Annex T.

[160] Corpus 1301 Folio 139988. Cabrera Report (March 2008) Annex T.

[161] Corpus 1966, Folio 206.449, Shefftz's Economic Criteria, September 2010.

and other companies. Again, if Chevron were only required to pay damages but could retain its massive excess profit directly related to its malfeasance, the company (and other companies) would have every incentive to continue its reckless disregard for the environment.

2. Adjusting the Avoided Costs Based on the Probability of Detection, Prosecution and Ultimate Payment

Mr. Shefftz concluded that "[t]he appropriate unjust enrichment estimate should represent the amount of money that would make the company indifferent between compliance and noncompliance."[162] An unscrupulous company like Chevron is obviously more inclined to choose to break the law when it believes it will never face repercussions – in order to be deterred, the company must be made aware that, under such circumstances, the penalty will be even higher if and when the day of reckoning comes. Thus, the total amount of unjust enrichment should be adjusted in an inverse relationship to the probability of detection, prosecution, and ultimate payment.[163] It is an accepted method in the United States, Chevron's home jurisdiction, that if the probability of detection of a violation is less than 100%, the penalty needs to be increased to reflect that lower probability. If the potential for prosecution of a violation is less than 100%, the penalty should be increased to reflect that lower probability as well. Finally, if the potential for ultimate payment to correct the environmental violation is lower than 100%, the penalty must be increased as well.

Here, Texaco's malfeasance was unlikely to be detected. The operations were carried out in remote areas of the Amazon rainforest. While Petroecuador owned the Concession, Texaco was the sole operator and exercised day-to-day decision-making as to the oil extraction operations – including the environmental protection methods that would be employed. In fact, Texaco instructed employees not to record certain spill data to cover-up its crimes and minimize the potential of detection.[164] When Texaco left Ecuador, it signed a remediation agreement purporting to have remediated sites which were never remediated.[165] Texaco took great pains to assure that its pollution would never be detected. The company did not believe – and indeed had no reason to believe – that a group of indigenous communities would ultimately be empowered to shine a light on the company's malfeasance to the rest of the world.

Likewise, Texaco believed that it would not be successfully prosecuted or that it would ultimately pay for the damage it caused. The company pulled all of its assets out of Ecuador, perhaps in an attempt to shield itself from liability. Chevron then fought in federal court in the United States for years to re-venue the case in Ecuador, in an attempt to deny the Plaintiffs a cause of action and to deplete their limited resources.

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[162] Corpus 1966, Folio 206.447, Shefftz's Economic Criteria, September 2010.

[163] Corpus 1966, Folio 206.447, Shefftz's Economic Criteria, September 2010.

[164] See Page 15 et seq. of the first part of the alegato, submitted 17 January, 2011.

[165] See Page 54 et seq. of the first part of the alegato, submitted 17 January, 2011.

The company has brazenly vowed that it will not respect any judgment entered by this Court and will fight enforcement.

It is therefore more likely than not that Chevron, based on its behavior, believed (and continues to believe) that it can escape liability for its misconduct. It is therefore appropriate for this Court to adjust the avoided costs outlined above for the probability of detection, prosecution, and ultimate payment. Assuming a 25% factor, Mr. Shefftz concluded that this would result in total unjust enrichment damages of **$18,262,934,521** (factoring in United States taxes that Chevron may or may not have paid) to **$37,855,146,208** (not factoring in taxes).[166] If this Court concludes that Chevron believed the potential its detection, prosecution, and payment was 50%, the range of damages would be **$9,131,467,260** (factoring in United States taxes that Chevron may or may not have paid) to **$18,927,573,104** (not factoring in taxes).[167]

In summary, compelling Chevron to correct the damages it has caused by paying compensation for environmental, cultural, and health damage is a vital component of the total damages picture – yet these damages alone fall short. Chevron must also be compelled to give up the money in its coffers which results from Texaco's decision to break the law and abandon due care in Ecuador. Only then will justice be done.

V. COMPENSATION FOR THE DEVASTATING EFFECTS ON PUBLIC HEALTH CAUSED BY TEXACO'S DELIBERATE CONTAMINATION

Plaintiffs respectfully submit, consistent with the demand stated in their Complaint filed almost eight years ago, that Chevron must be compelled to address the health crisis caused by Texaco's deliberate and indiscriminate release of toxins, including known carcinogens, into the environment.[168] The long-term effects of these toxins on the region's residents have only begun to be felt – and a system is needed to assist those that suffer (or will suffer) health problems due to exposure to contaminants associated with Texaco's extraction operations. An improved health care program is required both to manage the health risks associated with the oil-related contamination. Part of any reasonable plan to maintain the health of the affected populations must include ensuring that the residents of the region have access to clean drinking water. Chevron must also account for excess cancer deaths (both that have occurred and that are projected) attributable to Texaco's toxic legacy in the Napo Concession area. Each of these concepts will be addressed below.

[166] Corpus1966, Folio 206.451, Shefftz's Economic Criteria, September 2010.

[167] Corpus 1966, Folio 206.451, Shefftz's Economic Criteria, September 2010.

[168] Corpus 1, Folio 80: Complaint, at VI.2.d

A. FUNDING FOR THE PROVISION OF ADEQUATE HEALTHCARE TO THE AFFECTED POPULATION

Texaco's environmental abuses in the Napo Concession area have affected all facets of life in the region, and the consequences will be felt long after this litigation has concluded. Those who reside in the Concession area continue to be exposed to a potent cocktail of harmful chemical constituents that are highly toxic to human health, capable of causing significant permanent injury and even death. Numerous scientists from all over the world have identified, studied, and written about the health crisis in the Oriente region.

In 1993, the Union of Popular Health Promoters of Ecuadorian Amazonia ("UPPSAE") conducted a study of approximately 1500 people living in 10 Amazon communities – 7 characterized by historical by oil activity, 3 that were not – when health officials began noticing that most of the people who traveled to the health center in Pacayacu were not from nearby communities, but rather, were coming predominately from communities near oil-related activities.[169] Among other findings, the study revealed: (1), the median for number of diseases was 3 per person in communities impacted by oil, compared to 2 in communities with no oil-related activities; (2) the incidence of skin infections was 3 times higher in communities impacted by oil, and twice as high with respect to incidences of mycosis, anemia, urinary tract infections and tuberculosis; (3) Shushufindi oilfield, Ecuador's most productive oil area, had the highest incidence of tuberculosis in the whole province; (4) For women drinking water less than 200 m away from oil production facilities, the rate of miscarriages was 147% more than for those inhabiting uncontaminated areas; (5) 49% of families living near oil production facilities have suffered some kind of accident that has damaged their health, such as bathing in contaminated waters, poisoning from gas, falling into pits containing crude oil, or contact with chemicals – people affected by such accident suffered pyodermatitis, mycosis, headaches, respiratory problems, and allergic reactions.[170]

Also in 1993, the Center for Economic and Social Rights, a New York-based health and human rights group, sent a team of Harvard-trained scientists to collect and study 33 drinking and bathing water samples from inhabited areas near former Texaco oil operations.[171] The report, released in 1994, found that the concentrations of Polycyclic Aromatic Hydrocarbons (PAHs)

[169] Unión de Promotores Populares de Salud of the Amazonia Ecuatoriana ("UPPSAE") *Culturas bañada at petróleo. Diagnóstico de salud realizado por promotores*. Abya Yala. 1993. Lago Agrio. Ecuador.

[170] Id.

[171] Brooke, J., Pollution Of Water Tied to Oil In Ecuador, NY Times, Mar. 22, 1994, *available at* http://query.nytimes.com/gst/fullpage.html?res=9907E0D9153CF931A15750C0A962958260

and Benzene in the area's water for human consumption were several times in excess of safety limits established by USEPA – levels that suggest a carcinogenic risk between 1/100,000 and 1/1,000.[172] The study concluded that the exposed population exhibited frequent dermatosis, suggesting a growing risk of developing severe health conditions ranging from cancer to neurological and reproductive problems.[173]

Several years later, in 2000, Dr. Miguel San Sebastián, specializing in environmental epidemiology, conducted a study of over 500 women from 9 contaminated communities (within 5 km of oil-production facilities in the Oriente region) and 14 non-contaminated communities (more than 30 km away from oil-production facilities).[174] The survey found significantly elevated instances of skin fungi and symptoms of acute poisoning in the contaminated communities.[175] Moreover, the incidence of miscarriages was 150% higher than in non-contaminated areas.[176] The study also measured the incidence of cancer in the community of San Carlos, where figures for larynx, liver, skin, lymphoma and stomach cancer were frequent. The study revealed that cases of cancer were 130% higher – and the risk of dying from cancer was 260% higher – than in the city of Quito.[177] Over the course of the next several years, Dr. San Sebastián and his team published several additional studies, each illuminating the alarming statistics concerning cancer, including childhood leukemia, and pregnancy complications unfolding in the Oriente region.[178]

Even with proper remediation, the threat to the health of the indigenous people of the Oriente region will abate slowly, over many years. The threat to human health is magnified by the region's inadequate healthcare system – a system not designed to address a major public health crisis caused by an outsider's introduction of toxins into the environment. To address the emerging healthcare needs of a population facing this crisis, a practical and sustainable healthcare system must be implemented in the Oriente region. In this Section, we discuss two

[172] Jochnick et al. *Rights violations in the Ecuadorian Amazon: the human consequences of oil development*. Health and Human Rights. 1994, 1:82-100.

[173] Id.

[174] Corpus 34 Folio 3339-3393: San Sebastian, et al. Yana Curi Report: Impact of petroleum activity on the health of rural populations in the Equatorial Amazon. 2000. Icaria. Barcelona, Spain.

[175] *Id*. at __.

[176] *Id*. at __.

[177] *Id*. at __.

[178] San Sebastian et al., Exposures and cancer incidence near oil fields in the Amazon basin of Ecuador. Occup Environ Med. 2001, 58:517-22l; San Sebastian et al. *Health of women living near oil wells and oil production stations in the Amazon region of Ecuador*. Rev Panam Salud Publica. 2001, 9:375- 84l; San Sebastian et al. *Outcomes of pregnancy among women living in the proximity of oil fields in the Amazon basin of Ecuador*. Int. J. Occup Env. Health. 2002, 8:312-9.; Hurtig A.K. and San Sebastian, M. *Gynecologic and breast malignancies in the Amazon basin of Ecuador, 1985–1998*. Int. J. Gynecol. Obstet. 2002, 76:199-201; Hurtig A.K. and San Sebastian, M. *Geographical differences in cancer incidence in the Amazon basin of Ecuador in relation to residence near oil fields*. Int. J. Epidemiol. 2002, 31:1021-7; Hurtig A.K. and San Sebastian, M. *Incidence of childhood leukemia and oil exploitation in the Amazon basin of Ecuador.* Int J Occup Environ Health. 2004, 10:245-50.

different paths to bringing about this much needed change. While the two approach are quite different, both appear sound and their purpose is the same – to determine the cost of providing vital healthcare to the affected population.

1. Toxicity to Human Health Caused by Exposure to Constituents in the Concession Area

The various contaminants introduced into the environment by Texaco during its 26 years of oil exploitation and production activities undeniably pose a significant threat to the health and safety of the population.[179] The scientific community has long documented the harmful effects of these constituents in numerous studies and peer-reviewed research.[180] Exposure to these contaminants can occur through inhalation, ingestion, or direct skin contact.[181] When an individual is exposed to a toxic substance, various factors affect whether injury will result, including the concentration of the substance, the duration of exposure, and the individual's age.[182] Children, the elderly, and pregnant women are particularly susceptible to injury caused by exposure to these deadly substances.[183] The potential for injury is magnified for residents of the Concession area, who have been exposed to a cocktail of harmful chemical constituents that may have a compounding effect.[184]

At least nineteen different toxic substances have been detected in the environment of the Concession area.[185] Exposure to these nineteen substances poses a threat to human health in a variety of ways. To wit:

- **Barium** – vomiting, abdominal cramps, diarrhea, difficulties in breathing, increased or decreased blood pressure, numbness around the face, muscle weakness, changes in heart rhythm or paralysis, increased blood pressure or abnormal heart rhythms, and death[186];
- **Benzene** – drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, unconsciousness, blood poisoning, changes to bone marrow, vomiting, irritation

[179] Corpus Corpus 1297, Folio 139547-139559. Cabrera Report (March 2008) Annex K .

[180] Corpus Corpus 1297, Folio 139547. Cabrera Report (March 2008) Annex.

[181] Corpus Corpus 1297, Folio 139547. Cabrera Report (March 2008) Annex K.

[182] Corpus Corpus 1297, Folio 139547-139548. Cabrera Report (March 2008) Annex K

[183] Corpus Corpus 1297, Folio 139548. Cabrera Report (March 2008) Annex K.

[184] Corpus Corpus 1297, Folio 139548. Cabrera Report (March 2008) Annex K.

[185] Corpus Corpus 1297, Folio 139547. Cabrera Report (March 2008) Annex K

[186] Agency for Toxic Substances and Disease Registry. 2006b. Public Health Statement for Barium, http://www.atsdr.cdc.gov/toxprofiles/phs24.html.

of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, coma, and death[187];

- **Cadmium** – severe shortness of breath and wheezing, chest pain and chest tightness, persistent cough, weakness and malaise, anorexia, nausea, diarrhea, frequent urination at night, abdominal pain, coughing up blood, prostration, and death[188];
- **Chromium** – stomach ulcers, convulsions, kidney and liver damage, and death[189];
- **Copper** – irritation to the nose, mouth, and eyes; headaches; dizziness; nausea; diarrhea; liver and kidney damage; and death;[190]
- **Ethyl Benzene** – eye and throat irritation, respiratory distress, decreased movement, dizziness, liver and kidney damage, nervous system changes, and blood changes[191];
- **Lead** – damage to the kidney and brain, premature births, and intrauterine death in pregnant women;[192]
- **Mercury** – permanent damage to the brain and kidneys;[193]
- **Nickel** – chronic bronchitis, rhinitis, sinusitis, nasal septal perforations, asthma, and cancer of the lung and nasal sinus;[194]
- **Nitrogen Oxides** – rapid burning, spasms, swelling of tissues in the throat and upper respiratory tract, reduced oxygenation of body tissues, build-up of fluid in the lungs, pulmonary edema, inflammation of the lungs, bronchitis, inflammation of the small airways, emphysema, and death;[195]

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[187] Agency for Toxic Substances and Disease Registry. 2006f. Public Health Statement for Benzene, http://www.atsdr.cdc.gov/toxprofiles/phs3.html.

[188] Agency for Toxic Substances and Disease Registry. 1999b. Public Health Statement from the Toxicological Profile for Cadmium. http://www.atsdr.cdc.gov/toxprofiles/tp5.html.

[189] Agency for Toxic Substances and Disease Registry. 2000a. Public Health Statement from the Toxicological Profile for Chromium, http://www.atsdr.cdc.gov/toxprofiles/tp7.html.

[190] Agency for Toxic Substances and Disease Registry. 2004a. Public Health Statement from the Toxicological Profile on Copper, http://www.atsdr.cdc.gov/toxprofiles/tp132.html.

[191] Agency for Toxic Substances and Disease Registry. 1999d. Public Health Statement from the Toxicological Profile for Ethylbenzene, http://www.atsdr.cdc.gov/toxprofiles/tp110.html; Agency for Toxic Substances and Disease Registry. 2000c. Hazardous Substances Data Bank (HSDB) on ethylbenzene, http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB.

[192] Agency for Toxic Substances and Disease Registry. 2005a. Public Health Statement for Lead, http://www.atsdr.cdc.gov/toxprofiles/phs13.html.

[193] Nadakavukaren, A. 2000. Our Global Environment (5th ed.), Waveland Press, Illinois.

[194] Agency for Toxic Substances and Disease Registry. 2005a. Hazardous Substances Data Bank (HSDB) on nickel compounds, http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB.

[195] Agency for Toxic Substances and Disease Registry. 2002. ToxFAQs™ for Nitrogen Oxides, http://www.atsdr.cdc.gov/tfacts175.html; Agency for Toxic Substances and Disease Registry. 2007d. Medical

- **Particulates** – irritation of the airways, coughing, difficulty breathing, lung disease, decreased lung function, aggravated asthma, chronic bronchitis, irregular heartbeat, nonfatal heart attacks, and premature death in people with heart or lung disease;[196]
- **Petroleum Hydrocarbon** – irritation of the throat and stomach, central nervous system depression, difficulty breathing, pneumonia, and permanent damage to the lungs, central nervous system, reproductive system liver, and kidney;[197]
- **Polycyclic Aromatic Hydrocarbon** – respiratory complications, tumors in the pharynx and larynx and neoplasms of the upper digestive tract, and pulmonary, cardiovascular, neurological, kidney, and liver complications;[198]
- **Sulfur Dioxide** – respiratory tract irritant, acute airway obstruction, bronchospasm, pulmonary edema, inflammation of the lungs, altered sense of smell, increased susceptibility to respiratory infections, symptoms of chronic bronchitis, and accelerated decline in pulmonary function;[199]
- **Sulfuric Acid** – irritation to the nose and throat, difficulty breathing, tooth erosion, and death;[200]

Management Guidelines (MMGs) for Nitrogen Oxides (NO, NO2, and others), http://www.atsdr.cdc.gov/MHMI/mmg175.html.

[196] U.S. Environmental Protection Agency. 2006a. Frequent Questions on Fine Particle (PM 2.5) Designations, http://www.epa.gov/pmdesignations/faq.htm#0; U.S. Environmental Protection Agency. 2006b. Particulate Matter, http://www.epa.gov/oar/particlepollution/health.html.

[197] Agency for Toxic Substances and Disease Registry. 1999c. Public Health Statement from the Toxicological Profile for Total Petroleum Hydrocarbons (TPH), http://www.atsdr.cdc.gov/toxprofiles/tp123.html.

[198] Gupta, P., D.K. Banerjee, and S.K. Bhargava. 1993. Prevalence of impaired lung function in rubber manufacturing factory workers exposed to benzo(a)pyrene and respirable particulate matter. Indoor Environ. 2: 26-31; Hansbrough, J.F., et al. 1985. Hydrocarbon contact injuries. J Trauma. 25, 3: 250-2; Thyssen, J., et al. 1981. Inhalation studies with benzo[a]pyrene in Syrian golden hamsters. J. Natl. Cancer Inst. 66: 575-7.

[199] Agency for Toxic Substances and Disease Registry. 1998a. Public Health Statement from the Toxicological Profile for Sulfur Dioxide, http://www.atsdr.cdc.gov/toxprofiles/tp116.html; Agency for Toxic Substances and Disease Registry. 2007c. Medical Management Guidelines (MMGs) for Sulfur Dioxide (SO2), http://www.atsdr.cdc.gov/MHMI/mmg116.html.

[200] Agency for Toxic Substances and Disease Registry. 1998b. Public Health Statement from the Toxicological Profile for Sulfur Trioxide and Sulfuric Acid, http://www.atsdr.cdc.gov/toxprofiles/tp117.html.

- **Toluene** – headache, fatigue, nausea, loss of coordination, memory loss, reversible disorders of the optic nerves, cardiovascular effects, renal tubular damage, loss of consciousness, coma, and death;[201]
- **Vanadium** – conjunctivitis, coughing, wheezing, difficulty in breathing, industrial bronchitis, and alters contractions in the heart;[202]
- **Xylene** – irritation of the skin, eyes, nose, and throat, difficulty in breathing, impaired function of the lungs, delayed response to a visual stimulus, impaired memory, headaches, lack of muscle coordination, dizziness, confusion, stomach discomfort, possible changes in the liver and kidneys, and death;[203]
- **Zinc** – stomach cramps, nausea, vomiting, anemia, damage to the pancreas, and decreased levels of beneficial high-density lipoprotein cholesterol.[204]

2. Methodology Utilized in the Cabrera Report

Inhabitants of the Concession area face a stark reality – one in which healthcare adequate to address issues arising from toxic exposure is not available and medical needs go unmet. The Cabrera Report provides a cost estimate of the organizational and structural changes necessary to implement a comprehensive healthcare system to remedy this state of affairs. The healthcare structure must go beyond addressing immediate healthcare needs and provide sustainable methods for future monitoring and prevention. As an initial matter, the sheer inadequacy of the Ecuadorian healthcare system only amplifies the plight of the affected population.[205] Under the current healthcare regime, there are very few specialized programs designed to address contamination-related health issues. Health facilities in the region can provide only basic care – basic care that might be more passable absent a public health crisis stemming from Texaco's introduction of toxic chemicals. The Cabrera Report proposes a three-tiered organizational

[201] Agency for Toxic Substances and Disease Registry. 2007a. Medical Management Guidelines for Toluene, Management Guidelines for Toluene, http://www.atsdr.cdc.gov/MHMI/mmg56.html.

[202] Agency for Toxic Substances and Disease Registry. 1992. Public Health Statement from the Toxicological Profile for Vanadium, http://www.atsdr.cdc.gov/toxprofiles/tp58.html; Agency for Toxic Substances and Disease Registry. 2005c. Hazardous Substances Data Bank (HSDB) on Elemental Vanadium, http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB.

[203] Agency for Toxic Substances and Disease Registry. 2006g. Public Health Statement for Xylene, http://www.atsdr.cdc.gov/toxprofiles/phs71.html.

[204] Agency for Toxic Substances and Disease Registry. 2006c. Public Health Statement from the Toxicological Profile for Zinc, http://www.atsdr.cdc.gov/toxprofiles/tp60.html; Agency for Toxic Substances and Disease Registry. 2006d. Hazardous Substances Data Bank (HSDB) on elemental zinc, http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB.

[205] *See generally* Cabrera Report, Annex P.

healthcare structure focusing on health assistance, environmental and health monitoring, prevention and promotion, research, and reporting.

Using a fifty-year projection, the Cabrera Report calculates the total healthcare expenditures necessary to implement the proposed structured healthcare system at **$480,208,279**.[206] This figure is, of course, a result of factoring in numerous smaller variables relevant to instituting this comprehensive healthcare proposal. The following figures represent just some of these variables utilized over the fifty-year projection to arrive at the total of $480,208,279:

- *Creation and operation committee*: A committee made up of highly-specialized experts for operative design of each stage and component of the health program for the first three months; these experts will conduct workshops with local teams and hire qualified personnel, among other things – **$690,800**.
- *Hiring a permanent Program Coordinator*: implies resources for his/her activity, including transportation, materials, office equipment, facilities, communications, etc. – **$3,693,260**
- *Design and implementation of a Fund for organizational strengthening*: including initial capitalization and maintenance of trust fund – **$9,649,486**
- *Support for institutional strengthening of the health system*: Including training, transportation, and connectivity issues – **$256,763,611**.
- *Communication outreach*: Materials to promote the new healthcare system will cost an estimated **$15,621,810**.
- *Funding for scientific studies*: The healthcare system will require occupational, community, and epidemiological studies as well as highly specialized environmental studies at a cost of **$79,317,100**.
- *Fund for research on health determining factors in productive areas*: including occupational health monitoring sub-group – **$51,836,350**
- *Unforeseeable costs*: To account for unforeseeable expenses, 15% of the final healthcare subtotal – **$62,635,.62 [sic]** – is stored as reserve funds.[207]

Each of these components is critical to ensuring the creation of an adequate and sustainable healthcare system that addresses the unusual medical needs of individuals residing in the Concession area.[208]

[206] Cabrera Report, Annex P, at 42.

[207] Cabrera Report, Annex P, at 42.

[208] Cabrera Report, Annex P, at 41-42.

3. Methodology Utilized in Dr. Picone's Report

In his report titled "Estimated Cost of Delivering Health Care to the Affected Population of the Concession Area of Ecuador," appended to Plaintiffs' Escrito dated September 16, 2010, Dr. Carlos E. Picone[209] also conducts an estimation of the cost to implement a practical healthcare system in the affected regions. While Dr. Picone's path to this goal is quite different than what is posited by the Cabrera Report, Dr. Picone's reasoning is sound in its own right.

Dr. Picone stresses the importance of recognizing that the current healthcare infrastructure in the Concession area is woefully inadequate and incapable of meeting the needs of the affected population.[210] For example, based on publicly available information, in the Sucumbios and Orellana provinces, there are only five physicians and hospital beds per 10,000 residents – a startling figure to say the least.[211] The Sucumbios and Orellana provinces historically receive only 2.6% of Ecuador's healthcare spending – ranking these two regions near the bottom in terms of the country's healthcare expenditures per capita.[212]

To ensure the healthcare system implemented is efficient and capable of meeting the heightened healthcare needs of the affected population, the system must account for primary medical services, preventative and rehabilitative services, and education and training.[213] The optimal data needed to calculate the cost of instituting this comprehensive healthcare system is not readily available, as data is sparse in this rural, underdeveloped region.[214] Therefore, alternative methods to estimating the cost of providing effective healthcare to the Concession area must be considered.[215] Dr. Picone discusses two methods in particular to value the cost of bringing adequate healthcare to the region to address the health crisis spurred by Texaco's toxic

[209] Dr. Picone, a physician from Washington, D.C., is certified in internal and pulmonary medicine, critical care, and palliative medicine. Dr. Picone earned his Doctorate from the National University of Cordoba in Spain, and also studied at the Medical College of Virginia, in the United States, and has likewise been a professor at both institutions. He previously held the position of President of the Pan American Medical Association, a non-profit organization dedicated to organizing good faith medical and surgical missions in Central and South America. Dr. Picone possesses first-hand knowledge of the challenges of providing medical care to the rural populations of Ecuador through his medical missions to the country. Dr. Picone has authored and co-authored several publications, which have appeared in prominent medical journals

[210] Picone Report, number 3.

[211] Picone Report, at 3 (citing Ecuadorian Ministry of Public Health. 2002. Social and Health Security: Ecuador. Risks Profile, Vulnerability and Health and Social Exclusion. Final Report.; Ecuadorian Ministry of Public Health National Competitive Billing. 2008. Acquisition of 18 Tomography Machines Detailed in: 9 of 8 Cortes and 9 of 16 Cortes June – 2008. No. MSP/000/0003/2008).

[212] Picone Report, number 3.

[213] Picone Report, number 4-5.

[214] Picone Report, number 5.

[215] Picone Report, number 5.

legacy: (1) utilizing per capita healthcare spending in the entire country of Ecuador; and (2) comparing total healthcare costs for those injured by the attacks on the World Trade Center towers in New York on September 11, 2001.

(a) *Approach One: Per Capita Healthcare Cost Estimate*

Dr. Picone's first approach considers the amount spent on healthcare in Ecuador in 2008 and then projects those costs over the next thirty years.[216] Data provided by the World Health Organization indicates Ecuador spent $231 per person on healthcare in 2008.[217] Utilizing ten-year population projections for the Concession area, the estimated cost of providing adequate healthcare to the Concession Area from 2010 through 2019 equals $469,267,491. Although no accurate population projections are available from 2019 through 2040, assuming no population growth during that time period – a factor that would only increase estimated costs – Dr. Picone calculates it will cost **$1,407,802,473** to provide proper healthcare to the Concession area over the next thirty years.[218] This is an *extremely conservative* estimate insofar as it only accounts for the implementation of a primary healthcare system to meet the most urgent needs of the population. Improvements to the Ecuadorian infrastructure are necessary to be able to provide a more comprehensive healthcare system.[219]

(b) *Approach Two: Comparison to World Trade Center Programs*

Dr. Picone's second approach draws wisdom from an analogous, crisis-specific healthcare delivery system – the programs implemented to assist workers exposed to potentially harmful dust and debris during and in the aftermath of the attacks on the World Trade Center in September 2001.[220] Although there are many obvious differences between the health issues implicated by the World Trade Center disaster and issues related to Chevron's long-term contamination of the Concession area, both situations involve complex environmental exposures.[221] One estimate puts the cost of providing healthcare to affected workers in New York City from 2001 through 2010 at $535.7 million.[222] Projecting this figure out to thirty years results in a cost of **$1.6 billion** to provide proper healthcare to the

[216] Picone Report, number 5.

[217] Picone Report, number 5 (citing World Health Organization. 2008. WHO estimates for country NHA data, http://www.who.int/nha/country/ecu.pdf).

[218] Picone Report, number 6.

[219] Picone Report, number 6.

[220] Picone Report, number 7.

[221] Picone Report, number 7.

[222] Picone Report, number 7 (citing NYC 2007).

Concession Area.[223] Again, this is a conservative estimate for a number of reasons: (1) the affected population in the Concession area is more than three times greater than the affected population of the World Trade Center attacks; (2) Ecuador's healthcare infrastructure pales in comparison to the infrastructure already in place in New York City; and (3) the World Trade Center attacks did not involve long-term exposure, as is the case in the Concession Area.[224]

B. FUNDING FOR THE DELIVERY OF POTABLE WATER

1. State of Potable Water in Ecuador

Access to a consistent supply of safe and clean water is paramount to the health of every population.[225] "The overriding goal of all potable water public works projects is to supply all residents, customers, or inhabitants with the safest potable water for ingestion and other uses."[226] Yet, it is well documented by several expert and technical reports including: Fugro-McClelland (1992), HBT Agra (1993), Woodward-Clyde (2000), and the Cabrera Report (2008) that Texaco's petroleum "exploration and production activities have adversely affected the quality of soil, sediment, *groundwater*, and *surface water* in the Concession area" in Ecuador.[227] According to the Cabrera Report, Chevron operated over 300 oil production sites containing pumping stations, oil processing sites, waste lakes, exposed oil well caps, and waste dumping areas.[228] Years of Texaco's petroleum exploration has resulted in the release of hydrocarbons, metals, and other substances.[229]

The release of oil-related substances into the environment is particularly dangerous to the health of the residents of the Napo Concession area. Based on a 2007 study, it is apparent that the populations in the Concession area generally live near "roads and highways" in the provinces and certain communities are located adjacent to the very access roads leading to Texaco's exploration and production facilities.[230] Surface water is likely the main source of water for

[223] Picone Report, number 7.

[224] Picone Report, number 7-8.

[225] Corpus 1968 Folio 206.651 Robert Paolo Scardina's Economic Criteria, Costs Associated with a Potable Water System to Supply the Affected Population of the Concession Area of Ecuador ("Scardina Report") 2 (2010). World Health Organization and UNICEF, Progress on Sanitation and Drinking Water-2010 Update, Joint Monitoring Programme for Water Supply and Sanitation, (2010).

[226] Corpus 1968, Folio 206.656, Scardina's Economic Criteria, September 2010.

[227] Corpus 1968, Folio 206.651, Scardina's Economic Criteria, September 2010.

[228] Corpus 1300 Folio 139.887 Cabrera Report (March 2008) Annex R

[229] Corpus 1968, Folio 206.651, Scardina's Economic Criteria, September 2010. Corpus 1300, Folio 139.886. Cabrera Report, (March 2008)

[230] Corpus 1968, Folio 206.652, Scardina's Economic Criteria, September 2010.

communities in the Concession area.[231] The water source for some communities is "upstream from current oil production facilities" and in other instances the water supply is "'within the area of the oil fields."[232] However, reliance on groundwater as an alternative source is no better. Groundwater "'usually originates in shallow aquifers exposed to contamination" stemming from oil activities.[233] Moreover, the quality of the potable water systems varies greatly across the two Provinces – some communities had functional municipal water supplies, some had systems that were not operational requiring repair and or replacement, and others had no public water supply services.[234] Many in the hundreds of smaller communities had no drinking water system relying instead on hand dug groundwater or surface water wells. Indeed, multiple sources support the "assessment that water service quality and sustainability is low in many areas of Ecuador."[235]

Based upon the environmental sampling permitted to date, the known environmental contamination resulting from Texaco's activities are near areas of known oil operation such as "production wells, storage pits, surface water outfalls, and documented spills".[236] Indeed, groundwater samples collected by the technical experts indicate TPH contamination in groundwater.[237] Plaintiffs' technical experts found TPH contamination in 59% of the groundwater samples collected, whereas Defendants technical experts only found contamination in 1% of the samples taken.[238] Groundwater testing directed by Engineer Cabrera confirms that TPH is contaminating groundwater, as 32% of the samples exceeded Ecuadorian TPH 0.325 mg/L standards.[239] The locations within the Concession area and extent of the total amount of groundwater, surface water, and sediment contamination resulting from Texaco's operations, however, may not be as easy to identify and quantify. Oil contaminants are mobile and "are

[231] Corpus Corpus 1300 Folio 139889. Cabrera Report (March 2008) Annex R.

[232] Corpus Corpus 1300 Folio 139889. Cabrera Report (March 2008) Annex R.

[233] Corpus Corpus 1300 Folio 139889. Cabrera Report (March 2008) Annex R.

[234] Corpus 1968, Folio 206.653, Scardina's Economic Criteria, September 2010.

[235] (citing Organization of American States, Department of Sustainable Development, Criterios Y Acciones Para El Cuplimiento De Las Metas of the Milenio at Agua Y Saneamiento, (2005); World Health Organization and UNICEF, Progress on Sanitation and Drinking Water-2010 Update, Joint Monitoring Programme for Water Supply and Sanitation (2010); World Health Organization and UNICEF, Progress on Sanitation and Drinking Water-2010 Update, Joint Monitoring Program for Water Supply and Sanitation (2010)).

[236] Corpus 1968, Folio 206.651, Scardina's Economic Criteria, September 2010.

[237] Corpus 1244 Folio 134252. Technical Summary Report by Engineer Richard Stalin Cabrera Vega Expert for the Court of Nueva Loja (March 2008).

[238] Corpus 1244 Folio 134252. Cabrera Report (March 2008) The disparity is not at all surprising in light of Chevron's scientifically bankrupt sampling methodology, discussed at length in the prior phase of Plaintiffs' Alegato Final.

[239] Corpus 1244 Folio 134253 Cabrera Report (March 2008)

likely to move away from their release area in groundwater, surface runoff, sediment, and surface water".[240] Because of this mobility, there is "the potential for future migrations" of the contaminants to water sources not presently affected.[241] Indeed, there are no less than 10 rivers and several tributaries flowing north to south through the Concession area,[242] *exponentially* increasing the severity of any water contamination. For these reasons, reliance on water sources from anywhere within the Concession area for use as drinking water by the local population may pose a health risk.

Due to the toxins released by Texaco, water sources within the Concession area should be classified as contaminated and "unsuitable . . . for use as drinking water."[243] Because Texaco's oil operation activities caused the release of oil contaminants into the waterways, Chevron is responsible for the costs expended to provide safe and clean drinking water for the population of the Napo Concession area.

2. Remediation Options

The Cabrera Report set forth and analyzed three systems capable of providing safe and clean water supply to the populations of the Provinces of Sucumbíos and Orellana. Dr. Robert Paolo Scardina ("Dr. Scardina"), in the context of a report appended to Plaintiffs' Escrito of September 16, 2010, also analyzed these systems.[244] They are: an individual household system, a community system, and a regional system.[245]

(a) *Individual Household and Community Based Systems*

Neither the individual household nor community based water systems will prove cost-effective or guarantee the provision of safe and clean potable water for personal or other uses.[246] First, both rely on water supplied from the Concession area. As noted above, water supplies in

[240] Corpus 1968, Folio 206.651, Scardina's Economic Criteria, September 2010.

[241] Corpus 1968, Folio 206.651-206.652, Scardina's Economic Criteria, September 2010.

[242] Corpus1300 Folio139886. The main rivers running through Sucumbíos and Orellana provinieses are: the Putumayo, the Cuyabeno, the San Miguel, the Aguarico, the Jivino, the Coca, the Napo, the Rimiyacu, the Tiputini, the Tivacuno. Corpus 1300 Folio 139886. Cabrera Report (March 2008) Annex R

[243] Corpus 1968, Folio 206.651, Scardina's Economic Criteria, September 2010.

[244] Dr. Scardina earned a Bachelor of Science Degree in Mining Engineering, a Master of Science Degree in Environmental Engineering and a Ph.D in Civil Engineering from Virginia Polytechnic Institute, one of the leading institutions in research as well as technical and scientific education in the United States. He has authored and co-authored several publications in the field of drinking water supply and related matters. Dr. Scardina's doctoral dissertation related to "potable drinking water treatment practices and a specific problem that can cause issues or problems to conventional potable drinking water treatment processes." He has taught several courses concerning engineering and water treatment, including Introduction to Environmental Engineering, Fluid Mechanics for Civil Engineers, and Water and Wastewater Treatment, a senior-level design course. Scardina has analyzed potable water in various states in the United States of America. Corpus 1968 Folio 206.666-206.668, Scardina's Economic Criteria, September 2010.

[245] Corpus Corpus 1300 Folio 139892. Cabrera Report (March 2008) AnnexR.

[246] Corpus 1968 Folio 206.649 206.665, Scardina's Economic Criteria, September 2010.

Concession area are contaminated from petroleum production activities. Because oil contaminants are mobile, water sources which are presently clean may become contaminated in the future.[247] Future contamination may occur due to the "migration of contaminants into previously uncontaminated watersheds" through "groundwater, in groundwater discharging to surface water, or in downstream transport in surface water" in the Concession area.[248]

It cannot be known what water sources will degrade and become contaminated over time.[249]

Any watershed found to be contaminated would need to be remediated or abandoned.[250] Thus, while upgrading and repairing contaminated water systems on a community level may resolve contamination issues in the short-run, this method is not sustainable as it does not eliminate the threat of future contamination of these repaired water systems.[251] This method would also require (a) a "comprehensive evaluation" of the current water systems and (b) ongoing monitoring indefinitely.[252] Both are clearly expensive undertakings.

Additionally, while Chevron may offer evidence that some communities have already undertaken to improve their water supply systems or have developed plans to do so, these programs do not offset Chevron's remediation obligations. Reliance on individual communities or funding from nongovernmental organizations ("NGOs") to solve water contamination problems is inadequate. First, not all communities have the means to remediate, second there is no guarantee that these programs will be effective, not to mention that programs in the planning phase may never come to fruition.

Economies of scale also dictate that "a universal system is typically the lowest cost method for delivering the same quality potable water to all residents . . . ."[253] By way of example, the Cabrera Report explains that the approximate per household cost of a water supply system would be between $4,000 and $5,000 as each household would require the installation of a significant amount of equipment including a drilled water well, a sanitary seal, a filter in water well, a pump, and pipes for water tanks and distribution.[254] Moreover, there are other factors which render at home treatment undesirable, such as variations in the quality of the input water and variations in the quality of the output water due to "operator (resident) misuse" and failure to use the treatment system.[255] Repairs and updates to the water systems within the Concession area

[247] Corpus 1968 Folio 206651 – 206.652, Scardina's Economic Criteria, September 2010.

[248] Corpus 1968 Folio 206653-206-254, Scardina's Economic Criteria, September 2010.

[249] Corpus 1968 Folio 206.654 Scardina 2010.

[250] Corpus 1968 Folio206.653 Scardina 2010.

[251] Corpus 1968 Folio 206.654 Scardina 2010.

[252] Corpus 1968Folio206.654-206.655 Scardina 2010.

[253] Corpus1968 Folio 206656 Scardina 2010.

[254] Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008

[255] Corpus 1968 Folio 206.656 Scardina 2010.

will require constant monitoring, may prove ineffective, and ultimately be costly to maintain.[256] For the above reasons, neither the individual household nor community based systems for providing potable waters to the residents of the Concession area are good alternatives.

(b) *Regional Based System*

The appropriate and cost-effective potable water supply system to develop in the Concession area is a regional based system. Under this model, potable water is brought from outside the Concession area. Indeed, both Dr. Scardina and the Cabrera Report conclude that a regional system is the optimal means to provide potable water to the Concession area.[257] Providing potable water from a regional based system using surface water upstream and away from the Concession area and known areas of contamination will avoid many of the pitfalls of the community and individual household systems.[258] Critically, this method avoids the uncertainty of the quality of the water supplies in the Concession area. Moreover, it eliminates the potential of future contamination to water supplies caused by the migration of oil contaminations, and ensures a sustainable and safe water supply now and in the future for the Concession area residents.[259] Additionally, the regional model will provide a safe source of potable water for nearly all residents of the Concession area.[260] Finally, because of economies of scale, this universal method for providing a quality water supply will ultimately be less expensive than the other systems.[261]

Since the regional system is supported by both the Cabrera Report and Dr. Scardina, Plaintiffs propose the creation of three regional systems to supply clean potable water to all residents of the Concession area. Each regional system would "use surface water catchment or intake systems [collection wells] located in the riverbeds upstream from oil production facilities."[262] Horizontal collection wells would set up along rivers to collect surface

water.[263] Regional system No. 1 will supply communities north of the Aguarico River; Regional system No. 2 will supply communities bounded by the Aguarico River, Coca River, and Napo River, and Regional system No. 3 will supply communities south of the Napo River in the district of Francisco de Orellana.[264] In addition to the three regional systems, the Cabrera Report designated a fourth area consisting of communities downstream from the oil activities (the

[256] Corpus 1968 Folio 206.655 Scardina 2010.

[257] Corpus 1968 Folio 206.655 Scardina 2010.

[258] Corpus 1968 Folio 206.655 Scardina 2010.

[259] Corpus 1968 Folio 206655 Scardina 2010

[260] Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008

[261] Corpus 1968 Folio 206.656 Scardina 2010

[262] Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008

[263] Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008

[264] Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008.

("Downstream Communities").[265] These communities will instead be provided solar engineering pumping to supply potable water via groundwater systems.[266]

Some critics of the regional system may assert that use of this process will not lead to safer potable water because the waterways outside of the Concession area are themselves contaminated not by petroleum related contaminants—but by human and animal borne pathogens. Concern about human and animal pathogen contamination is commonplace in all waterways. This argument is a red herring. The fact of the matter is that there is oil contamination in the waterways of the Concession area and to obtain water free of oil contamination that water must be brought in from outside of the region. As Texaco's petroleum activities caused water contamination in the Concession area, Texaco bears the burden to pay the cost of providing safe and clean water into the Concession area, even if that includes funding water disinfectant processes not wholly related to oil contamination.

3. The Cabrera Report Cost Projection

(a) *Factors to Consider*

There are two primary factors to consider when calculating the cost of the development and implementation of a regional water supply system: the planning horizon (the period to develop each water supply system's design for the projected population growth over that time) and the per capita water consumption level.[267] The Cabrera Report assumed a per capita water consumption of 150 liters per person per day and a planning horizon of 20 years.[268] Indeed, Dr. Scardina opined that it is conventional practice to develop capital costs for the development of water treatment processes based upon population growth over a twenty year period.[269]

(b) *Population*

The Cabrera Report applied a population growth rate of 4.4% based upon on annual growth rates put forth in the 2001 National Census for the five districts in the Provinces of Sucumbíos and Orellana within the Concession area.[270] The Cabrera Report used population figures from 2007 and projected population growth for the year 2027, twenty years later. In the Cabrera Report, the 2007 listed population for the Provinces of Sucumbíos (which includes the Cascales, Lago Agrio, and Shushunfindi districts) and for the Province of Orellana (which includes the Joya de los Sachas and Francisco de Orellana districts) to be serviced by the regional water supply system is approximately 140,985 (Region 1 (60,324), Region 2 (63,605), and Region 3 (17,056).[271] Adjusting for a 4.4% growth rate, the 2027 projected population is

[265] Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008.

[266] Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008

[267] Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008

[268] Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008

[269] Corpus 1968 Folio 206.657 Scardina 2010

[270] Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008

[271] Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008

348,232 (Region 1 (149,000), Region 2 (157,104), and Region 3, 42,128).[272] In addition to the populations serviced by the regional system, according to 2007 population estimates, an additional 27,900 live in the downstream communities and in 2027, the projected population there will be 102,170. Collectively, the projected 2027 population for the whole region is 450,402.

(c) *Construction costs*

In order to build and maintain the infrastructure necessary to provide a regional water supply system there are certain and specific investment, construction, and operations and maintenance costs to consider.[273] The investment costs include piping and treatment, distribution networks, household connections, meters, and pumping, transportation, and storage.[274] Accordingly to the World Bank, adjusting for inflation in the year 2007, a distribution network cost $224/person; catchment/intake and treatment $69/person, household connections $69/person, and meters $75/person.[275] Other construction costs should be added as well, such as the length of water aqueducts, diameter of pipes, and overall storage capacity.[276]

In addition to these hard factors, it is commonplace to include engineering project cost projections and "unforeseen expenses" such as construction cost overruns, remediation costs, unexpected delays, etc. The Cabrera Report added 30% for unforeseen expenses to its projected total investment costs for each regional water supply system.[277] While this may appear to be a high percentage at first glance, Dr. Scardina explained that "it is not uncommon in engineering design to always put a safety factor at the end of [the] cost evaluation or design evaluation."[278] Dr. Scardina was indeed familiar with other projects that included a 30% safety contingency cost.[279]

Multiplying the above investment and construction cost factors by the resident populations within each regional water system in 2027, the Cabrera Report found that the investment and construction cost for Region 1 is $152,846,549 and factoring in the construction of 120 kilometers (km) of pipes for an aqueduct 600 to 700 millimeter (mm) in diameter. [280] In Region 2, which will provide potable water to the Lago Agrio and Shushufindi districts in the Province of Sucumbíos, and Sacha District in the Province of Orellana, the Cabrera Report found that the investment and construction cost is $194,391,861, which includes the construction of

[272] Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008

[273] Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008

[274] World Bank, 2002. Ministry of Urban Development and Housing, Development Plan for Drinking Water and Sanitation Facilities. Table 2. 2002 Unit Amounts and Prices. [LINK?]

[275] *Id*.; Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008.

[276] Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008.

[277] Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008.

[278] Corpus 1968 Folio 206.661-206.6662 Scardina 2010

[279] Scardina Tr. 274:6-11.

[280] Corpus 1968 Folio 139.882 et seq. Cabrera Report, Annex R.

165 km of pipes for an aqueduct 600 to 700 mm in diameter.[281] For Region 3, which will supply potable water to the Francisco de Orellana District, the Cabrera Report found that the investment and construction cost is $80,766,007, including the construction of 100 km of pipes for the aqueduct 600 to 700 mm in diameter.[282] Collectively, the average per/person cost to construct a system to supply water to a resident of one of the three regions is $1222 (Region 1 ($1026), Region 2 ($1237), and Region 3 ($1917)).[283] For the downstream communities, the Cabrera Report found that the investment and construction cost would be $18,098,056. If this court chose to discount the 30% unforeseen expense amount and find that the investment and construction costs for Region 1 is $117,574,269; Region 2 is $149,532,201, Region 3 is $62,127,698, and the downstream communities is $12,668,640.

(d) *Engineering and Operations and Maintenance Expenditures*

Developing regional water supply systems will necessitate other expenditures such as those related to engineering and supervision of the entire construction process. Typically, an additional ten percent is added to the overall construction costs to account for engineering design and construction supervision.[284] Accordingly, the engineering design and construction supervision costs for the three regions are $15,284,655 (Region 1), $19,439,186 (Region 2), $8,076,601 (Region 3), and $2,010,448 (downstream communities).[285] Once the projects are complete, they will require regional general operations and maintenance upkeep.[286] Costs will include utilities, personnel, replacement and repair of hardware, and various other indirect costs.[287] Based upon values derived from a report: *Supply of Drinking Water and Sanitary Sewer System for Duran*, the Cabrera Report found that the per person daily operations and maintenance cost is $0.32 per cubic meter of water supplied.[288] The total operations and maintenance cost is dependent upon the size of the projected population over the course of a given time period and the amount of water used daily.[289] The Cabrera Report provided monetary amounts for operation and maintenance costs of 5, 10, 15, and 20 years, applying maintenance costs for a 10-year period, after which the report presumed that each community would institute a fee system.[290] Accordingly, applying a 10-year rate, the report found that operations and maintenance costs in Region 1 would be $18,975,564, in Region 2 would be $19,556,947, in Region 3 would be $5,244,294, and for the downstream communities would be $2,006,426.

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[281] Corpus 1300 Folio 139.882 et seq. Cabrera Report, Annex R.

[282] Corpus 1300 Folio 139.882 et seq. Cabrera Report, Annex R.

[283] Corpus 1300 Folio 139.882 et seq. Cabrera Report, Annex R.

[284] Corpus 1300 Folio 139.882 et seq. Cabrera Report, Annex R.

[285] Corpus 1300 Folio 139.882 et seq. Cabrera Report, Annex R.

[286] Project for the Supply of Drinking Water and Centers for Collection and Processing in Durán. CEDEGE. 2002. Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008.

[287] *Id*.

[288] *Id*.

[289] Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008.

[290] *Véase* Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008.

Taken together, the collective construction, engineering and supervising, and operation and maintenance costs among Regions 1, 2, 3, and the downstream communities result in a total cost of **$536,696,594**.

4. Scardina Cost Projection

(a) *Factors to Consider*

Dr. Scardina notes that water supply engineering costs are the product of daily water consumption levels per capita and projected population growth over a set design period.[291] Dr. Scardina uses a 20-year period, thus utilizing population estimates for the year 2030, twenty years from 2010; the year he issued his report.[292] It is conventional practice to develop capital costs for the development of water treatment processes based upon population growth over a twenty year period.[293] Dr. Scardina further assumed a water use of 250 liters per day per capita which is less than the average per day use in the United States, but more than what the Cabrera Report applied.[294]

(b) *Population*

Analyzing recent population growth rates derived from US Central Intelligence Agency, UNICEF, and Instituto Nacional de Estadistica y Censos ("INEC") data, Dr. Scardina arrived at a population growth of 2.4%.[295] The 2.4% calculation growth is a conservative population

growth rate; indeed, it is two percentage points below the Cabrera Report's rate.[296] Thus using a different conventionally accepted and less conservative population growth model would yield even higher population growth.[297]

The Province of Sucumbíos consists of three districts: Lago Agrio, Cáscales, and Shushufindi. According to the INEC, the estimated population of Sucumbíos in 2010 was 155,703, split nearly evenly between rural and urban residents.[298] Based on the estimated 2.4% growth rate, Dr. Scardina projected that by 2030 the region's population would be 250,205.[299]

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[291] Corpus 1968 Folio 206.659. Scardina's Economic Criteria, 2010.

[292] Corpus 1968 Folio 206.659. Scardina's Economic Criteria, 2010

[293] Scardina Tr. at 229:11-230:22.

[294] Corpus 1968 Folio 206.659 Scardina Report.

[295] Corpus 1968 Folio 206.660 Scardina Report.

[296] Tr. Scardina 233:11-22; *véase también* Corpus 1300 Folio 139.882 et seq. Annex R of the Cabrera Report 2008

[297] Scardina Tr. 234:10-14.

[298] Instituto Nacional de Estadistica y Cenos (INEC), Ecuador-Proyecciones De Poblacion Por Provincias, Cantones, Areas, Sexo Y Grupos De Edad – Periodo: 2001-2010, Serie OI No. 206. (2004).

[299] Corpus 1968 Folio 206.653 Scardina

The Province of Orellana includes the districts Joya de los Sachas and Francisco de Orellana.[300] According to the INEC, the 2010 population for the Orellana region is 95,477 (39,899 urban and 55,578 rural). [301] Dr. Scardina projected that by 2030 the entire region's population would be 153,425.[302] Collectively, the total projected population using a population growth rate of 2.4% in 2030 is 403,630.

(c) *Construction Costs*

Dr. Scardina bases his cost estimate, like the Cabrera Report, on costs for the three regional water systems which include the construction of "piping and treatment, distribution network, household connections, metering, pumping, transport, storage, and a contingency for anticipated expenses."[303] Per the Cabrera Report, as indicated above, the total construction cost for Regions 1, 2, and 3 is $438,004,417 ($1229 per capita).[304] Accordingly, Dr. Scardina applies the same base cost estimates for each of these components including a 30% increase to account for unexpected construction costs and therefore reaches the same $1229 per capita figure. Dr. Scardina adjusts this figure to account for inflation at 3% per annum since 2007, when the Cabrera Report original cost estimates were released.[305] Adjusting for inflation, Dr. Scardina determines that the average per capita cost is $1342.[306]

By multiplying the $1,342 per capita cost of construction by the projected 2030 population of the Concession area - 403,630, Scardina concludes that the cost of building the three regional water systems is **$541,671,460**.[307] Of note, and unlike the Cabrera Report, this estimate does not include engineering and supervision or operations and maintenance costs.

(d) *Other Potential Expenditures*

While Dr. Scardina did not provide additional numbers, he notes that other factors may increase the cost. First, Dr. Scardina notes that that there may be additional treatment steps to provide potable water to the Concession area such as removing human or animal borne pathogens or adding disinfect booster stations to ensure that pathogens remain inactive as water travels through the distribution pipeline.[308] The processes to remove these pathogens are

[300] Instituto Nacional de Estadistica y Cenos (INEC), Ecuador-Proyecciones De Poblacion Por Provincias, Cantones, Areas, Sexo Y Grupos De Edad – Periodo: 2001-2010, Serie OI No. 206 (2004).

[301] Instituto Nacional de Estadistica y Cenos (INEC), Ecuador-Proyecciones De Poblacion Por Provincias, Cantones, Areas, Sexo Y Grupos De Edad – Periodo: 2001-2010, Serie OI No. 206 (2004).

[302] Scardina Report, at 3. Economic Criteria. September 2010.

[303] Scardina Report, at 11. Economic Criteria. September 2010

[304] Scardina Report, at 11. Economic Criteria. September 2010

[305] Corpus 1968 Folio 206.660 Scardina2010. Economic Criteria. September 2010

[306] Corpus 1968 Folio 206.660 Scardina2010. Economic Criteria. September 2010

[307] Corpus 1968 Folio 206.661 Scardina . Economic Criteria. September 2010

[308]Corpus 1968 Folio 206.658 Scardina 2010. Economic Criteria. September 2010

conventional and include: physical separation through a gravitational flow sand media filter, ozone disinfection, and/or reverse osmosis membranes.[309] Of these three, the most cost effective is the sand media filter.[310] Second, Dr. Scardina noted that the cost would also increase if additional water supply systems had to be built for persons beyond the service of the three regional water systems.[311] Such persons might include the downstream communities noted in the Cabrera Report. In sum, it appears that Dr. Scardina's estimate is very much a low-end figure.

C. COMPENSATION FOR PAST AND FUTURE CANCER DEATHS IN EXCESS OF BASELINE STATISTICS

As stated in the earlier phase of Plaintiffs' Alegato Final submitted to the Court on January 17, 2010 pursuant to Article 2336 of the Civil Code, Chevron is liable not only for damages that its acts and omissions have *already* caused, but also for "future" or "contingent" damage.[312] Indeed, the Supreme Court has noted that a party may be liable for "the predictable prolongation or worsening of a current damage, according to the circumstances of the case and the experiences of life."[313] With this legal framework in mind, the Plaintiffs respectfully submit a range of approximately $3 billion to $70 billion in damages resulting from excess cancer deaths within the Four Cantons of the Lago Agrio area.

The Cabrera Report (March 2008) valued these damages at roughly **$2.97 billion** in 2008 U.S. dollars.[314] The Cabrera Report calculated excess cancer deaths to be 428, and multiplied that number by the "value of a statistical life" ("VSL") of $6.8 million to arrive at his damages figure. Later, in the November 2008 Cabrera Report, the exposed populations were calculated to better reflect those living in the actual Concession area.[315] With those numbers in hand, the Cabrera Report calculated that the total amount of excess cancer deaths attributable to contamination was 1,401.[316] Multiplying that figure by the $6.8 million VSL, the Carbera Report estimate of the value of excess cancer death increase to **$9.53 billion**.[317]

In response to the Court's Order that the plaintiffs provide economic criteria to remediation and environmental damages, Plaintiffs', on September 16, 2010, submitted a report prepared by Dr. Daniel Lee Rourke. The purpose of that report was two-fold: (1) estimate the number of excess cancer deaths within the Concession Area region in Ecuador and (2) provide a

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[309] Corpus 1968 Folio 206.657 Scardina 2010. Economic Criteria. September 2010

[310] Corpus 1968 Folio 206.657 Scardina Economic Criteria. September 2010

[311] Corpus 1968 Folio206.601 Scardina 2010.

[312] Ecuadorian Civ. Code Art. 2236 (formally Art. 2260) (Book IV) (granting a right of action for "contingent damages which threaten indeterminate persons due to any person's imprudence or negligence.")

[313] Third Instance Sentence. Judicial Gazette. Year XCI. Series XV. No. 10. Pg. 3048. Published 12 November, 1990

[314] Corpus 1300 Folio139.835 Annex Q of the Cabrera expert report.

[315] Corpus1431 Folio 152.985 Clarification of the Cabrera expert. November 2008

[316] Corpus 1431 Folio 152.986 Clarification of the Cabrera expert. November 2008.

[317] Corpus 1431 Folio 152.986 Clarification of the Cabrera expert. Novimbre 2008.

total monetary value for those deaths.[318] Utilizing his own statistical analysis to calculate excess cancer deaths from 1967 to 2080 (which is the date that he calculated would be the last excess cancer death), and then applying a VSL of $7 million (which is roughly the same as Cabrera's), Dr. Rourke first provided a damages estimate of **$46.9 billion**. He then revised that number to account for (1) the total population of the Four Cantons and (2) the impact of future remediation. Accounting for those two factors resulted in an even larger damages calculation: $59 billion to $69.7 billion. The method by which Dr. Rourke arrived at these figures is described in greater detail below.

1. Excess Cancer Mortality Rate

Dr. Rourke utilized publicly available census data provided by the Instituto Nacional de Estadistica y Censos (INEC) to calculate the population of the Concession Area from 1967-2009.[319] Dr. Rourke used that data to calculate the excess cancer mortality rate for various age groups in this population, broken down by year, dating back to 1967. He also used trends in this data to calculate age-specific mortality rates dating back to 1967 – a figure necessary to calculate the number of excess cancer deaths.[320]

Given these age-specific mortality rates, Dr. Rourke used statistics provided by Hurtig and San Sebastian to compute an individual's excess cancer risk.[321] Hurtig and San Sebastian compared the cancer risk of individuals residing in the Four Cantons (Lago Agrio, Shushufindi, La Joya de los Sachas, and Orellana, which contain most of the Concession Area)[322] to the cancer experience of persons residing in eleven cantons with no oil production facilities.[323]

In arriving at the excess cancer risk numbers, Dr. Rourke offered no opinion as to causation.[324] Rather, he relied on the Hurtig and San Sebastian report to find excess cancer deaths associated with residents in oil producing areas.[325] As Dr. Rourke testified at his

[318] Corpus 1967 Folio 206.579 Rourke's Sept. 12, 2010 Report (hereinafter, "Original Rourke Report"), at 3.

[319] Original Rourke Report, in folios 206.577. Chevron has claimed that oil production in Ecuador did not begin until 1972. Nevertheless, even if Dr. Rourke were to calculate his numbers from 1972, the result of his analysis would be minimal.

[320] Original Rourke Report, folios206.576-206.578.

[321] Original Rourke Report, at 12 (citing Hurtig and San Sebastian, 2002).

[322] Of these four cantons, two are in Sucumbios and two are in Orellana.

[323] Original Rourke Report, at 12-13.

[324] Chevron's expert, Michael Kelsh ("Kelsh"), contends in his rebuttal report that Dr. Rourke did not discuss any scientific literature on potential cancer effects of contaminants associated with oil production. Michael Kelsh Rebuttal Report ("Kelsh Rebuttal Report"), at 4. According to Kelsh, that literature indicates "that such activities or exposures are not biologically capable of causing all types of cancer". (Kelsh Rebuttal Report, at 4. However, Kelsh (and for that matter, Chevron) misinterpret the scope of Dr. Rourke's report. As his deposition testimony makes clear, Dr. Rourke offered no opinion on causation because he was tasked with determining the number of excess cancer deaths, a purpose wholly independent of opining on the issue of causation. (Rourke Dep. 61:14-16.) Because Rourke offered no opinion as to cancer, Kelsh's criticism that Rourke assumed that "all types of cancer can be caused by petroleum" also misses the mark.

[325] Deposition of Daniel Lee Rourke ("Rourke Dep.") 46:12-19.

deposition, Hurtig and San Sebastian focused on the *correlation* between those living in oil producing regions, and they observed "somewhat more cancers than would be expected."[326] Thus, as interpreted by Dr. Rourke and described in his report, Hurtig and San Sebastian did not offer any opinion as to *causation*. Rather, they observed the correlation or association between living in an oil producing region and excess cancers in that same region. In that regard, studies Hurtig and San Sebastian cite discuss an association between exposure to petroleum and chemical air emissions and certain types of cancers:

> In the US, an ecological study found an association in both sexes between residential exposure to petroleum and chemical air emissions and cancer of the buccal cavity and pharynx. In males, increased age-adjusted incidence rates for cancers of the stomach, lung, prostate and kidney and urinary organs were also associated with petroleum and chemical plant air emission exposures. A study in the same country found high rates of cancer of the lung, nasal
>
> cavity and sinuses, and skin among the resident male population. Other studies in the US have suggested high rates of lung cancer and elevated risk of brain cancer among people living near petroleum plants.[327]

2. Calculating Excess Cancer Deaths

Because of the lingering effect of cancer, Dr. Rourke determined the last excess cancer death is not expected to occur until 2080. From 1967 to 2080, Dr. Rourke calculated 6,695 excess cancer deaths will occur within the Concession Area, assuming no newly exposed person enters the Concession Area after 2009. This assumption, of course, belies the reality that births will occur within the Concession Area and migrants are likely to enter the region after 2009, thereby significantly increasing the number of excess cancer deaths beyond 6,695.[328] One assumption Dr. Rourke made in arriving at this conclusion was that excess cancer risks existed in the Lago Agrio area between 1967 and 1987.[329]

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[326] Rourke Dep. 48:11-14.

[327] Hurtig, A-K and San Sebastian. 2002. Geographical Differences in Cancer Incidence in the Amazon Basin of Ecuador in Relation to Residence Near Oil Fields. *International Journal of Epidemiology*. 31:1021-1027 (citing Kaldor J. Harris JA, Glazer E *et al.* Statistical Association Between Cancer Incidence and Major-Cause Mortality, and Estimated Residential Exposure to Air Emissions from Petroleum and Chemical Plants. *Environ Health Perspect.* 1984; 54:319-32; Blot WJ, Brinton LA, Frumeni JF *et al*. Cancer Mortality in U.S. Counties with Petroleum Industries. *Science* 1977; 198:51-53; Gottlieb MS, Shear CL, Seale DB. Lung Cancer Mortality and Residential Proximity to Industry. *Environ Health Perpect* 1982; 45:157-64; Olin RG, Ahlbom A, Lindberg-Navier I *et al.* Occupational Factors Associated with Astrocytomas: A Case Control Study. *Am J. Ind. Med.* 1987; 11:615-25).

[328] Original Rourke Report, folio 206.517-206.535.

[329] Chevron twists Dr. Rourke's words in its marketing literature and claims that Rourke testified there was no scientific basis for that assumption. Dr. Rourke himself testified that he used the findings of Hurtig and San Sebastian as an assumption, meaning that he had conducted no scientific evaluation of his own with respect to excess cancers between 1967 and 1987. He did <u>not</u> testify that there was no scientific basis at all for the conclusion

Chevron, through a rebuttal report prepared by Michael A. Kelsh, also misses the mark by claiming that Rourke's opinion cannot be relied upon because Rourke did not consider prior literature (also authored by Kelsh) that critiqued the Hurtig and San Sebastian study.[330] In that critique, Kelsh and his co-authors state, among other things, that Hurtig and San Sebastian did not adequately account for population growth in the concession area. By not doing so, Kelsh contends that Hurtig and San Sebastian's findings may have overestimated the disease rates and cancer risks. However, Dr. Rourke did in fact consider this study. Dr. Rourke testified that he examined the data set forth in the critique of Kelsh and his cohorts, and he found that Kelsh et al.

may have used an outdated version of the International Statistical Classification of Disease and Related Health Problems ("ICD") coding.[331] Dr. Rourke used ICD-10 data, which was first used in 1997.[332] Kelsh and his team, however, stated that they utilized version ICD-10, yet the data from the study was taken from 1990.[333] As such, Dr. Rourke questioned the critique's data.[334]

3. Calculating the Total Monetary Value of Excess Cancer Deaths

Dr. Rourke calculated the value of a human life at $7 million by averaging figures provided in several U.S.-based studies.[335] Assuming the last newly exposed person enters the Concession Area in 2009, the total valuation of 6,695 excess cancer deaths amounts to **$46.9 billion**.[336]

By way of addendum, Dr. Rourke applied two recommendations suggested in the Original Rourke Report.[337] First, Dr. Rourke recommended using the total population of the four cantons – Lago Agrio, Shushufindi, La Joya de los Sachas, and Orellana (hereinafter, "Four Cantons") – that fall within the Sucumbios and Orellana provinces (as was done in the Hurtig and San Sebastian study) rather than just the population of the Concession Area as was the case in the Original Rourke Report. Dr. Rourke correctly hypothesized this would significantly increase excess cancer death numbers. Second, Dr. Rourke recommended considering the impact of potential future environmental remediation on the number of excess cancer deaths. Dr. Rourke again correctly hypothesized that this would generally reduce these numbers, but that the effects

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that excess cancers existed in Lago Agrio during this time period. On the contrary, in responding to an objectionable question asked by Chevron's counsel with respect to there being no scientific basis, Dr. Rourke responded: "[T]hat's too strong to say there's *no* scientific basis. I think it's somewhat more subtle than that. I guess there may be, but I don't have any documentation of it." (Rourke Dep. 119:4-7 (emphasis added).)

[330] Kelsh Rebuttal Report, folio206.518.

[331] Rourke Dep. 158:5-10.

[332] Rourke Dep. 158:5-160:14.

[333] Rourke Dep. 158:5-160:14.

[334] Rourke Dep. 158:5-160:14.

[335] Original Rourke Report, at 17-18. The Cabrera Report also calculated this figure to be $6.8 million.

[336] Original Rourke Report, at 18.

[337] Addendum to Original Rourke Report ("Addendum"), Folio 206.579-206.578.

of remediation would introduce additional at-risk populations for each year from 2010 until remediation is completed in 2020. As remediation progresses, the excess risk of cancer decreases, and no one after remediation is completed in 2020 is at an excess risk of cancer. Application of those recommendations provided a more precise – and larger – estimate of the number of excess cancer deaths and the total monetary value of those deaths.

4. Amended Calculation of Excess Cancer Deaths and Valuation.

Following these recommendations, Dr. Rourke provided two options for determining the number of excess cancer deaths and the valuation of these deaths. Option One takes into account the entire population of the Four Cantons but does not consider the impact of potential future

remediation, while Option Two considers the increased population and the impact of remediation.[338]

(a) Option One

Using the population of the Four Cantons, and still assuming the last newly exposed person enters in 2009, Dr. Rourke calculated 8,428 excess cancer deaths will occur within the Four Cantons, up from 6,695 excess cancer deaths calculated in the Original Rourke Report. Assuming the last newly exposed person enters in 2009, the valuation of 8,428 excess cancer deaths amounts to **$59.0 billion** within the entire region of the Four Cantons.[339]

(b) Option Two

Assuming, however, that remediation begins in 2011 and is completed in 2020, thus introducing newly exposed individuals for ten additional years, Dr. Rourke calculated 9,950 excess cancer deaths will occur within the Four Cantons. If the last newly exposed person enters in 2019, with remediation beginning in 2011 and completing in 2020, the valuation of 9,950 excess cancer deaths amounts to **$69.7 billion** within the Four Cantons.[340]

5. Kelsh's Mortality Rates

Moreover, even using the mortality rates reported in Table 1, page 14, of Kelsh's rebuttal report, the resulting damages associated with excess cancer deaths would number in the tens of billions of dollars and fall within the range of damages that Plaintiffs respectfully submit to the Court.[341] For example, assuming the last year of entry into the Four Cantons was 2009 and a VSL of $7 million is applied to the number of excess cancer deaths taken from the mortality

[338] Adendum to the Original Rourke Report. Folio 206.577.

[339] Adendum, to the Original Rourke Report. Folio 206.579-206.578.

[340] Amended Rourke Report, at 7.

[341] *See* Kelsh Rebuttal Report, p. 14.

rates reported in Table 1 of Kelsh's Report, the costs associated with excess cancer deaths would nevertheless result in roughly **$30 billion**. Applying those same figures to those living within 5 kilometers of the Concession Area, the costs associated with excess cancer deaths is approximately **$14 billion**.[342] If measuring the affected population in the Concesson Area (again assuming that the last year of entry was 2009) the costs associated with excess cancer deaths of those living in the Concession Area is roughly **$24 billion**. Again, these estimates are calculated using numbers proffered by *Chevron's own expert*.

* * *

While Chevron and its army of lawyers have bitterly fought this case for seventeen years and manufactured delay at every turn – making good on their promise to fight the indigenous people of the Ecuadorian Amazon "until hell freezes over" – the residents of the Oriente region continue to be exposed to toxic substances and the potential for serious injury and even death increases. A care and health integral system should be implemented to care for the caused injury by the introduction of toxins, by Texaco, in an environment once pristine. These populations should receive drinking water. And they should be compensated for having developed the cancer epidemic caused by Texaco's negligence for health and environmental health. In April 2005, a letter signed by a group of 61 of the most respected scientific minds hailing from 18 different countries[343] was published in the International Journal of Occupational and Environmental Health. In that letter, these scientists took Chevron's experts to task for dishonestly attempting to manufacture doubt about several valid, peer-reviewed studies linking Texaco's toxic legacy to disturbing health trends emerging in the Oriente region:

> An issue relevant to scientific integrity has arisen in connection with a court case in the Amazon . . . . On February 10, 2005 during the ongoing court proceedings, major newspapers in Ecuador ran a full-page (presumably paid) advertisement citing reports by scientists retained by Texaco who critiqued studies published in prestigious peer-reviewed journals that suggest links between adverse health effects and oil development in the Amazon. Epidemiologic studies, however meticulously conducted, may have inherent limitations, as all epidemiologists are aware. Epidemiology is not laboratory science but a study of the real world, and thus always subject to challenge in its ability to control for all potential effects. Especially in vulnerable study populations, exact details of the populations at risk, as well as the extents, natures, and durations of exposures, are difficult to document, and ascertainment of outcomes is limited by the quality of health services available. However, epidemiologic findings can confidently detect trends, and it is the body of evidence that should influence policy. The scientific process of peer review ascertains whether the potential weaknesses of any study raise doubts sufficient to preclude publication of its findings and conclusions.

[342] These figures presume that exposure begins after the sixth year of entry and a person is fully exposed 15 years after reentry. These numbers are lower than the calculations set forth in the Original Rourke Report and the Addendum. Such disparity is to be expected, however, because lower amount of deaths will result in a lower amount of damages.

[343] Namely – Ecuador, Brazil, USA, Mexico, Canada, Uruguay, Colombia, Israel, Italia, UK, Denmark, Sweden, India, Zimbabwe, Russia, Argentina, South Africa, Costa Rica.

> Texaco's consultants went to great pains to find flaws in the studies. Some of the so-called weaknesses they point out are not even themselves of particular concern . . . . Self-reported health effects— of which they also seem to question the validity—is a widely used and accepted practice . . . . It is far more logical to require a company extracting minerals or biological raw materials to accept responsibility, as good corporate citizens, for determining what protective measures it would be prudent to impose, and to monitor its success in controlling potential adverse human health and environmental effects. If this did not occur, should we not be asking "why not"? . . . . Texaco's protagonists, whether or not they agree about the adverse health impacts of the social and ecologic disruptions related to the oil company's operations, can hardly believe that the agents involved in drilling, and in the extracted oil, are innocuous. [344]

As identified by this collection of scientists in 2005, Chevron's experts' continuing refusal to acknowledge any relationship between the health crisis in the Oriente region and Texaco's poisoning of the soils and waters of that region over the course of more than twenty years strips these so-called experts of all credibility. Notwithstanding Chevron's attempts to criticize and find flaw, the scientific evidence remains, ostensibly, unchallenged. Indeed, as will be discussed in the next phase of Plaintiffs' Alegato Final, Chevron was *so disturbed* by the damning results of these health studies that it tried – unsuccessfully – to bribe a young American journalist to act as a corporate spy and try to find some alleged wrongdoing in relation to the studies.[345] Chevron's increasingly desperate attempts to discredit the scientific evidence have failed – the company is liable for the cost of repairing the health of the affected populations and answering for the deaths that it has caused and, sadly, those that its past conduct may lead to in the future.

VI. FINAL PLEA FOR DAMAGES

As set forth in detail above at Sections I through VII, with respect to virtually every category of damages, the experts (including Chevron's experts) have identified a number of variables that result in a range of possible awards. It is Plaintiffs position that, in every instance, there is ample justification for the Court to award – and indeed, the Court *should* award – the highest figure in that range. Nonetheless, to aid the Court in digesting the full range options before it, Plaintiffs present the following set of options, in summary form, corresponding to each of the seven categories of damages discussed herein.

[344] Breilh, J. *Texaco and its consultants (letter to the editor). International Journal of Occupational and Environmental Health*, Vol. 11/Nº 2, Apr/Jun 2005, p.217-220.

[345] Cuddehe, M., *A Spy in the Jungle*, The Atlantic, Aug. 2, 2010, *available at* http://www.theatlantic.com/international/archive/2010/08/a-spy-in-the-jungle/60770/#.

DAMAGES CATEGORY	BASIS FOR DAMAGES AWARD		PROPOSED DAMAGES AWARD
Soil Remediation	Cleanup to 100 ppm TPH	Cabrera Report: 803 out of 828 pits in oil wells, and all pits at production stations, to be remediated. Average depth of 5m for soil extraction. Area surrounding pits amounting to 50% of the surface area of the pits also must be remediated. *Ex-situ bioremediation technology applied to all pits at a unit cost of $489/m^3*.	Alternative #1 $2,743,000,000
		DCA: Modification of "tier" system identified in HBT Agra to delineate low, medium, and high-impact well sites. All production stations treated as high impact. Soil volume calculated assuming excavation to average depth of 4m. Remediation of soils 1m around pits and 15m around wells. Thermal desorption technology applied to medium and high-impact sites at a unit cost of $304/m^3. Composting technology applied to low-impact sites at a unit cost of $118/m^3.	Alternative #2 $948,934,409
	Cleanup to 1,000 ppm TPH	Cabrera Report: Based on site inspection data, only 80% of the pits at the well sites will be remediated to any extent; all pits will require remediation. Area surrounding pits amounting to 50% of the surface area of the pits also must be remediated. Remediation to a depth of 4m on average. *Ex-situ bioremediation technology applied to all pits at a unit cost of $489/m^3*.	Alternative #3 $1,852,000,000
		DCA: Modification of "tier" system identified in HBT Agra to delineate low, medium, and high-impact well sites. All production stations treated as high impact. Soil volume calculated assuming excavation to average depth of 2m. Remediation of soils 1m around pits and 15m around wells. Thermal desorption technology	Alternative #4 $486,969,221

		applied to medium and high- impact sites at a unit cost of $118/m^3. Composting technology applied to low-impact sites at a unit cost of $118/m^3.		
Groundwater Remediation	Cabrera Report: Although groundwater contamination was found during inspections, *full extent* of groundwater contamination has not yet been assessed given Texaco's failure to monitor groundwater during operations. As such, full cost of groundwater remediation not ascertainable absent further study. Reference to other cleanup projects suggests likely cost ranging from $3.5 million to $13.4 million per site over the course of 20 years, for a total of approximately $3.24 billion.			<u>Alternative #1</u> Entry of judgment in the amount of $3.24 billion, to be held in reserve pending *complete* groundwater study conducted by an expert approved by the court at Chevron's expense.
	DCA: Assumes off-site migration of groundwater is not significant. Production stations require remediation in proportion to the volume of oil and production water that was processed through them – categorized into one of four levels of contamination. Only the 210 well sites falling within the "medium impact" and "high impact" categories of contamination to be remediated to any extent.		Low-cost option relying on horizontal recovery trenches, but also subsequent years of natural attenuation to reach target 0.325 mg/l Ecuadorian standard for groundwater TPH.	<u>Alternative #2</u> $394,291,285
			Higher-cost option relying on horizontal recovery trenches and active groundwater pumping system. No need to rely on natural attenuation – target of 0.325 mg/l Ecuadorian standard for groundwater TPH reached with "active" remediation.	<u>Alternative #3</u> $910,818,627
Ecosystem/ Natural Resources Damages	Habitat equivalency analysis ("HEA") used to determine extent of recovery necessary,	Willingness-to-pay approach: Advantage – considers not only rainforest damage (the sole source of natural resource damage considered by the	Taking into account data from countries with a per capita income as high as	<u>Alternative #1</u> $1.42 billion

	taking into account history and duration of lost resources, as well as time, duration and effectiveness of future restorative action and natural recovery.	restoration approach) but also damage to ground and surface water. Disadvantage – more difficult to verify as the data points (culled from surveys) are subjective.	Brazil, estimate of $4,735 per hectare lost.	
			Taking into account data from all countries, estimate of $7,089 per hectare lost.	<u>Alternative #2</u> $1.697 billion
		Restoration cost method: Advantage – premised on objective data that can be studied. Disadvantage – does not include costs for restoring groundwater or surface water resources. Oil-related losses ($102,859,500) + road-related losses ($771,694,280).		<u>Alternative #3</u> $874,553,780
Decimation of Indigenous Culture	Plan #1 (outlined in Plaintiffs' Sept. 16, 2010 Escrito): (1) Preservation of culture accomplished by constructing and maintaining system of rescue centers for ancestral awareness and practices (main center with branch centers) ($56,500,000), including integral education program ($15,000,000) and the preservation, study and recovery of language ($10,000,000). (2) Purchase of two-hundred thousand hectares of land to mitigate territorial displacement and loss of food source at a total of approximately $400,000,000.			<u>Alternative #1</u> $481,500,000
	Plan #2 (outlined in Cabrera Report): (1) Recovery of forty-thousand total hectares of ancestral territory for Cofán, Huaraorani, Siona, and Secoya nations at $2,000 per hectare for a total of *$80,000,000*. (2) Nutritional recovery consisting of breeding facilities designed to reintroduce decimated aquatic species once typical of the rivers of Ecuadorian Amazonia; estimated cost of $400,000 annually for each facility; total cost for implementation of breeding plan estimated at *$320,000,000*. (3) Preservation of cultural traditions accomplished through			<u>Alternative #2</u> $430,000,000

<table>
<tr><td></td><td colspan="2">creation of centers for indigenous education for each of the four nations; operation estimated at $3,000,000 annually for a 10-year total of *$30,000,000*.</td><td></td></tr>
<tr><td rowspan="3">Unjust Enrichment</td><td colspan="2">Costs avoided – Texaco avoided three categories of costs by way of its malfeasance: (1) *Failure To Re-inject Formation Water*: had Texaco re-injected Formation Water as industry standard required, this process would have cost Texaco $0.81 per barrel – *$307,189,341* avoided. (2) *Failure To Capture Gases*: If Texaco had captured, rather than burned the gas it produced from wells, it would have spent $0.00171 per million cubic feet of gas – *$410,227,607* avoided. (3) *Placement Of Well Wastes In Unlined Pits*: It would have cost Chevron $70.48 per cubic meter to properly dispose of well wastes in a fashion that would likely not have contaminated surrounding soil and groundwater; assuming the existence of 916 waste pits covering a total area of 768,016 square meters – *$162,389,348* avoided.</td><td><u>Alternative #1</u>
$879,806,296</td></tr>
<tr><td rowspan="2">Weighted Average Cost of Capital (“WACC”): The “costs avoided” figure does not account for the fact that Chevron has been able to use its ill-gotten savings over time to invest in other businesses and technology. Based on exchange rates and Chevron’s expected profit values, the WACC approach accounts for the true value of the unjust profits to the company over time. (as proposed by Plaintiffs’ expert, Jonathan Shefftz).</td><td>Assume that Chevron paid no taxes on any of its profits from its operation in the Napo Concession.</td><td><u>Alternative #2</u>
$9,463,786,552</td></tr>
<tr><td>Assume that Chevron paid a high federal and state combined tax rate in the United States on its profits (unlikely given Chevron’s creation of multiple companies and subsidiaries to minimize tax liability).</td><td><u>Alternative #3</u>
$4,565,733,630</td></tr>
</table>

	Adjust the avoided costs (including WACC) outlined above for a 50% probability of detection, prosecution, and ultimate payment (as proposed by Plaintiffs' expert, Jonathan Shefftz).	Assume that Chevron paid no taxes on any of its profits.		Alternative #4 $18,927,573,104
		Assume that Chevron paid a high federal and state combined tax rate in the United States.		Alternative #5 $9,131,467,260
	Adjust the avoided costs (including WACC) outlined above for a 25% probability of detection, prosecution, and ultimate payment (as proposed by Plaintiffs' expert, Jonathan Shefftz).	Assume that Chevron paid no taxes on any of its profits.		Alternative #6 $37,855,146,208
		Assume that Chevron paid a high federal and state combined tax rate in the United States.		Alternative #7 $18,262,934,521
Healthcare To Address Public Health Crises Resulting From Texaco Operations	Approach #1 (as outlined by Plaintiffs' expert, Dr. Carlos Picone): Data provided by the World Health Organization indicates Ecuador spent $231 per person on healthcare in 2008. Utilizing ten-year population projections for the Concession area, the estimated cost of providing adequate healthcare to the Concession Area from 2010 through 2019 equals $469,267,491. Although no accurate population projections are available from 2019 through 2040, assuming no population growth during that time period (which renders this a *low* estimate), it will cost $1,407,802,473 to provide proper healthcare to the Concession area over the next *thirty years*.		30 years of healthcare	Alternative #1 $1,407,802,473
			20 years of healthcare	Alternative #2 $938,534,982
			10 years of healthcare	Alternative #3 $469,267,491

	Approach #2 (as outlined by Plaintiffs' expert, Dr. Carlos Picone): Comparison to health response to World Trade Center dust exposure – estimate places specialized healthcare for WTC workers in New York City from 2001 through 2010 at $535.7 million. Projecting this figure out to thirty years results in a cost of approximately *$1.6 billion* to provide proper healthcare to the persons in the Napo Concession.	30 years of healthcare	<u>Alternative #4</u> $1,607,100,000
		20 years of healthcare	<u>Alternative #5</u> $1,071,400,000
		10 years of healthcare	<u>Alternative #6</u> $535,700,000
	Approach #3 (outlined in Cabrera Report): Creation and maintenance of a healthcare system equipped to deal with medical phenomena caused by toxic exposure, including: (1) Creation and operation committee – $690,800; (2) Hiring a permanent Program Coordinator – $3,693,260; (3) Design and implementation of a Fund for organizational strengthening – $9,649,486; (4) Support for institutional strengthening of the health system – $256,763,611; (5) Communication outreach –$15,621,810; (6) Funding for scientific studies – $79,317,100; (7) Fund for research on health determining factors in productive areas –$51,836,350; (8) Unforeseeable costs reserve – $62,635,862.		<u>Alternative #7</u> $480,208,279

Delivery of Potable Water	Estimate set forth in report of Plaintiffs' expert Dr. Paolo Scardina, incorporated into Plaintiffs' Escrito of Sept. 16, 2010: Contemplates three regional systems (as opposed to localized systems). Horizontal collection wells set up along rivers to collect surface water. Assumes a per capita water consumption of 250 liters per person per day and a planning horizon of 20 years. Assumes conservative population growth rate of 2.4% based on population growth rates derived from US Central Intelligence Agency, UNICEF, and Instituto Nacional de Estadistica y Censos ("INEC"). Projected construction costs raised by 30% to account for unforeseen expenses. Engineering and operations and maintenance expenditures *not* factored in.		<u>Alternative #1</u> $541,671,460
	Estimate set forth in the Cabrera Report: Contemplates four regional systems, including a special system for communities downstream from oil activities whereby solar engineering will be used to pump potable water via groundwater systems. In all other regions, horizontal collection wells set up along rivers to collect surface water. Assumes a per capita water consumption of 150 liters per person per day and a planning horizon of 20 years. Assumes population growth rate of 4.4% based upon on annual growth rates set forth in the 2001 National Census for the five districts in the Provinces of Sucumbíos and Orellana. Projected construction costs raised by 30% to account for unforeseen expenses. Projected engineering and operations and maintenance expenditures *are* factored in.		<u>Alternative #2</u> $536,696,594
Excess Cancer Deaths	Estimates set forth in report of Plaintiffs' expert Dr. Daniel Rourke. incorporated into Plaintiffs' Escrito of Sept. 16, 2010: Population data used to calculate the age-specific, excess cancer mortality rate for various age groups in this population dating back to 1967. Statistics from Hurtig and San Sebastian study used to compute an individual excess cancer risk. Assumes last excess cancer death will not occur until	Population of *Concession area* identified using INEC census data and used as basis for calculation. Assumes no newly exposed person enters the Concession area after 2009. 6,695 excess cancer deaths expected occur	<u>Alternative #1</u> $46,900,000,000

	2080. Assumes value of human life of $7 million by averaging figures provided in several U.S.-based studies.	within the Concession Area.	
		Population of the Four Cantons that fall within the Provinces of Sucumbios and Orellana used as basis for calculation. Assumes no newly exposed person enters the Concession area after 2009. An expected 8,4286 [sic] excess cancer deaths are to be reported within the Four Cantons.	<u>Alternative #2</u> $59,000,000,000
		Population of the Four Cantons that fall within the Provinces of Sucumbios and Orellana used as basis for calculation. Assumes that remediation begins in 2011 and is completed in 2020, thus introducing newly exposed individuals for ten additional years. 8,4286 excess cancer deaths expected occur within the Four Cantons.	<u>Alternative #3</u> $69,700,000,000

	Estimates set forth in the Cabrera Report: Assumes value of a statistical life ("VSL") to be $6.8 million	March 2008: Total amount of excess cancer deaths attributable to contamination is calculated to be 428.	<u>Alternative #4</u> $2,970,000,000
		November 2008: Updated population figures used to conclude that total amount of excess cancer deaths attributable to contamination is 1,401.	<u>Alternative #5</u> $9,530,000,000
	Acceptance of criticism posed by Chevron's expert Michal Kelsh. Assumes accuracy of lower mortality rates reported in Table 1 of Kelsh's Report.	Assumes the last year of entry into the *Four Cantons* was 2009 and a VSL of $7 million.	<u>Alternative #6</u> $30,000,000,000
		Assumes the last year of entry into the area within *5 km of the Concession* was 2009 and a VSL of $7 million.	<u>Alternative #7</u> $14,000,000,000

Signed in my capacity as Counsel for the plaintiffs.

Atty. Pablo Fajardo Mendoza
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I, Anne Lutz, hereby certify that the document "February 1, 2011 Filing by Attorney Pablo Fajardo Mendoza to the Provincial Court of Justice of Sucumbíos, Lago Agrio, Ecuador" is, to the best of my knowledge and belief, a true and accurate translation from Spanish (Lat Am) to English.

Anne Lutz

Sworn to before me this
February 11, 2011

Signature, Notary Public

KRISTIN MILORO
Notary Public - State of New York
No. 01MI6212799
Qualified in New York County
Commission Expires Oct 19, 2013

Stamp, Notary Public