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VIETNAM AND THE UNITED STATES: MINING POLLUTION AND THE TRAGEDY OF THE COMMONS

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INTRODUCTION

This paper will discuss Vietnam’s mining pollution problem, and its efforts to foster clean water creation and an environmental protection framework within its Constitution, environmental laws and regulations. This paper will also juxtapose these issues with the United States’ regulatory mechanisms for mining and water quality protection, which in comparison are complex and well-rounded, but nonetheless still have regulatory and enforcement loopholes that prevent proper water quality protection.

In Vietnam, like most developing countries, regulations and policy statements place socioeconomic growth above water quality protection that frustrates these efforts. Environmental and water quality laws and regulations in Vietnam have not met overarching conservation goals, and as a result, Vietnam has one of the world’s highest
mortality rates due to polluted water.\(^2\) The commitment to curbing pollution in Vietnam, particularly mining pollution within waterways, resembles an ocean tide that moves to and fro.

At present, environmental scholarship focuses a significant amount of energy toward China. Even though Vietnam is virtually next door to China, it is not widely known that Vietnam is an emerging economic giant in Asia, and at the forefront of Asian industrialization. It has a growth rate of 7.5 percent, which places its economy at fifth in the world behind Nigeria, India, Iraq, and Bangladesh, respectively.\(^3\) On a diversity level, Vietnam is home to scores of ethnic minorities, and is one of the most biodiverse countries the world in terms of flora and fauna. It is also the world’s third largest producer of bauxite, or aluminum.

Vietnam’s industrial revolution and rise from third-world status to a major economic force in the world has both fueled and hindered environmental conservation and water quality protection. Because of this tension, Vietnam’s environmental, mining and water quality laws and regulations deserve a close examination.

In the Vietnam segment, Section I discusses Vietnam’s mining sector and harmful effects of various types of mining byproducts on the environment. Section II presents the backdrop of Vietnam’s reconstruction after the Vietnam War, and its entrance into the World Trade Organization, termed *Doi Moi*. Section III covers the Vietnamese Constitution and the Law on Environmental Protection. Section IV details Vietnam’s mining policy and law. Section V discusses Vietnam’s water resource and water quality


regulatory framework. Section VI discusses enforcement mechanisms used to meet regulatory benchmarks.

In the United States segment, Section I documents mining history and framework. Section II discusses water pollution regulation. Section III highlights several different laws that help protect water quality and work in conjunction with the Clean Water Act. Section IV discusses enforcement measures the United States has created and is still refining.

VIETNAM

I. MINING POLLUTANTS ARE SERIOUS HAZARDS TO HUMAN HEALTH AND AQUATIC LIFE

Legal and illegal mining in Vietnam is a factor in widespread pollution in watersheds and aquifers throughout the country. Industry participates in unregulated dumping of toxic pollutants in waterways to a startling degree. Indeed, the World Bank has estimated that Vietnam’s toxic intensity in waterways will increase 14.2 percent annually if adequate regulatory pollution prevention controls are not implemented.4

In a National Public Radio segment in 2006, a mining official characterized Vietnam as having an “amazing potential in terms of mineral wealth,” and as undeveloped in terms of mapping and exploitation.5 At present, ten percent of Vietnam’s Gross Domestic Product is generated from mineral exploitation.6 The country ranks number one in the world in titanium reserves (an estimated 650 million tons)7, third in the

world in bauxite reserves. There are over 5,000 documented mines in Vietnam, which hold 48 varying minerals. Nine hundred of those mines are thought to actually produce mineral product for sale, but the true number of operational mines is not known.

The fact is that all mining causes water pollution, as all metals and minerals require water and chemicals to separate metals from rock, and also require streams or lakes to discard toxic waste. Mining pollution can be particularly dangerous, as even small amounts can contaminate an entire water supply. For example, a recent article entitled, “Even Bottled Water is Unsafe,” reported that in early 2009 Vietnamese health officials found systemic contamination of municipal tap and bottled water in Hanoi. Elevated levels of arsenic and nitrates, and 6-18 times the normal level of ammonia, a chemical used in copper mining, were traceable.

Large mining projects are particularly worrisome, especially in countries such as Vietnam that rely on agrarian habitat for economic survival, and which do not have stringent regulations in place to protect water quality. For example, in 2006 the Vietnamese government signed an agreement with a large bauxite mining concern from China that developed a mine in the Central Highlands, an area rich in cultural diversity and farming. Bauxite mines are open-pit mines, and the refined component produces a toxic red sludge of arsenic and other chemicals that eventually leach into streams, rivers,
and aquifers. The most famous incident of bauxite-based sludge pollution is the tragedy in Hungary on October 4 of 2010.\textsuperscript{14} There, a reservoir of 1 million cubic meters of aluminum red sludge burst and inundated whole villages over 15 square miles,\textsuperscript{15} and killed at least nine people.\textsuperscript{16}

An arsenic spill in the Central Highlands of Vietnam would be devastating, as the area is composed of hundreds of ethnic villages, beautiful scenery, wildlife, and coffee CoOp’s. Since 1990, several hundred of these coffee farms have produced the world’s largest coffee exports,\textsuperscript{17} and exported the highest quantity of robusta beans in the world.\textsuperscript{18}

Just south of the Central Highlands lies Nam Cat Tien National Park, one of the most biologically diverse regions in Indochina.\textsuperscript{19} The region is so important for tourism and scientific study, that in October of 2010 several retired high-level officials, intellectuals, and scientists presented the government with a petition that requested a moratorium of any exploration or exploitation of bauxite in the area. The group warned that there may be a disaster like that of Hungary, and said that cancellation of the expensive co-sponsored China-Vietnamese project should occur “in the interests of ‘national destiny.’”\textsuperscript{20}

\textsuperscript{14} Mark Tran, \textit{Hungary Toxic Sludge Spill an ‘Ecological Catastrophe’ Says Government}, THE GUARDIAN, Oct. 5, 2010, \url{http://www.guardian.co.uk/world/2010/oct/05/hungary-toxic-sludge-spill}
\textsuperscript{15} \textit{Hungary: Toxic Spill Factory Chief Executive Arrested}, BBC NEWS EUROPE, Oct. 11, 2010, at \url{http://www.bbc.co.uk/news/world-europe-11514951}
\textsuperscript{19} Nam Cat Tien National Park: \url{http://www.namcattien.org/}
\textsuperscript{20} \textit{Supra} note 13.
Gold reserves have been found in central, southern, and northern regions of Vietnam, according to Nguyen Truong Giang, head of the Radioactive and Rare Minerals Division at the Ministry of Natural Resources and Environment. To emphasize the ubiquitous nature of gold in that region, a natural resources official of Na Ri District is reported to have said: “A handful of sand in any river or stream in Bac Kan has some gold dust.” Gold mining activity in Vietnam has increased in the past decade from both legal and illegal mining operations, which has resulted in severe water contamination in some cases. For example, the Bong Mieu Gold Mine in Quang Nam Province’s Phu Ninh District (located in the center of the country) is rumored to contain over five tons of gold, and mining there is in full operation. Located nearby is the Bong Mieu River, which supplies water for the mine, fishing, and domestic and riparian use to thousands of residents. Since the mine was constructed in 2006, there have been numerous reports of large numbers of dead fish in the river, livestock illness from river water consumption, and human skin diseases from bathing in the river. The toxic chemical that is causing these impacts is cyanide.

Cyanide leach mining is now the most popular method used by industrial hardrock mines to extract gold, due to its efficiency and cost-effectiveness. This method is popular in bootleg gold mines in Vietnam: nearly two tons of the chemicals

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22 See id.
were seized in May of 2010 in the northern district of Vietnam, and over three tons were
seized in December of the same year.\textsuperscript{27} Cyanide can kill with a tiny dose: only .05-0.2
grams, or the weight of a kernel of corn, is fatal to more than 50 percent of humans, and
is conducted through eye or skin exposure, ingestion, and inhalation.\textsuperscript{28} Aquatic species
are vulnerable to cyanide death in the “microgram per liter” level (one millionth part),
and bird and mammals are vulnerable to cyanide death in the “milligram per liter” (one
thousandth part) level.\textsuperscript{29}

The most dangerous situation involving cyanide is an accidental spill. Several
such spills around the world have devastated not only water bodies, but also entire
watersheds, and have severely affected both human inhabitants and biodiversity.
Examples include the Zortman-Landusky Mine, Montana, 1982, where 52,000 gallons of
cyanide spilled into Zortman, Montana’s water supply\textsuperscript{30}; the Summitville Mine, Del
Norte, Colorado, 1992, where toxic waste consisting of cyanide and other mining
chemicals was dumped into the Alamosa River, and killed all aquatic life for 17 miles;\textsuperscript{31}
the Aural Gold Plant, Romania 2000, where 3.5 million cubic feet of cyanide-
contaminated toxic waste spilled into Tisza River, a tributary of the Danube, poisoned the
water for 250 miles downstream and killed thousands of tons of fish\textsuperscript{32}; the Kumtor Gold
Mine, Kyrgyzstan, 1998, where a mining truck crashed and spilled 2 tons of sodium

\textsuperscript{27} Hua Xuyen Huynh, \textit{Cyanide Traffickers Caught in Central Vietnam}, THANH NIEN NEWS, Dec. 9,

\textsuperscript{28} \textit{Environmental and Health Effects of Cyanide}, INTERNATIONAL CYANIDE MANAGEMENT CODE
FOR THE GOLD MINING INDUSTRY at: \url{http://www.cyanidecode.org/cyanide_environmental.php}.

\textsuperscript{29} \textit{Supra} note 26, at 5-6.

\textsuperscript{30} \textit{See id.}

\textsuperscript{31} Timothy Egan, \textit{The Death of a River Looms Over Choice for Interior Post}, New York Times, Jan. 7,
2001 at: \url{http://www.nytimes.com/2001/01/07/us/the-death-of-a-river-looms-over-choice-for-interior-
post.html?pagewanted=all&src=pm}.

\textsuperscript{32} \textit{Supra} note 26 at 1.
cyanide into the Barskoon River, and resulted in four human deaths and 2,600 human poisonings.\textsuperscript{33}

The vast majority of gold mines in Vietnam are small, or artisanal, in size. In artisanal mining operations, mercury is used to extract gold from ore and evaporates into the air and onto flora and fauna.\textsuperscript{34} When mercury reaches the bottom levels of the food chain in algae and small aquatic animals, it increases in concentration as it passes from plant to human in a process called “bioaccumulation.” Toxicity levels peak in predator animals, such as tuna fish or stream-based trout, mammals, birds and humans.\textsuperscript{35} Moreover, chemical-laden animal scat contaminates surrounding habitat including land and aquatic plant species, creating a vicious cycle amongst ecosystems.

Since Vietnam is so rich in mineral wealth, its mining pollution problem is formidable in the present and will likely also be problematic well into the future. Solid regulations and policy goals are needed in order to safeguard Vietnam’s fresh water networks, but the country has chosen to place environmental protection as a whole on a lower level than economic growth.

\textbf{II. VIETNAM’S PLACE IN THE WORLD}

Vietnam is a Socialist Republic that was established in 1976 during the Vietnam War, and is controlled by the Communist Party of Vietnam (hereinafter “CVP”).\textsuperscript{36} Vietnam shaped its constitutional framework from the United States, and its Communist

\footnotesize{\textsuperscript{33} See id at 4. \\
\textsuperscript{34} EPA, REDUCING MERCURY POLLUTION FROM GOLD MINING at: \url{http://www.epa.gov/international/toxics/asgm.html} \\
\textsuperscript{35} SCIENTIFIC AMERICAN, \textit{Supra} note 3 and EPA, BASIC (MERCURY) INFORMATION at \url{http://www.epa.gov/hg/about.htm} \\
\textsuperscript{36} MARK A. ASHWILL AND THAI NGOC DIEP, VIETNAM TODAY: A GUIDE TO A NATION AT A CROSSROADS 16 (Intercultural Press 2005).}
political party framework from the former USSR, which was Vietnam’s patron during the Vietnam War. When diplomatic ties resumed with the West, the country embarked on a path to reconstruction as a market-based economy and liberalized trading partner in the World Trade Organization. This process was called *Doi Moi*, or “renovation,” and was formerly recognized in 1986 by the passage of numerous legal and political reforms.

Within 20 years Vietnam became the fastest growing economy within the ASEAN group in both industry and tourism, and one of the fastest growing economies in the world. Vietnam ranks 17th internationally for tourism growth, and is currently the world’s largest exporter of rice and the sixth largest producer of crude petroleum in Asia. It has been characterized as the world’s third largest “transitional” developing country, or a country changing from a centrally planned economy to a free market economy, behind China and Russia. Since *Doi Moi*, the government has aggressively sought and obtained massive foreign investment that has driven industrialization. Such

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37 *See id.* In 1945, Ho Chi Minh proclaimed Vietnam’s independence from France before a crowd of 500,000 people, and used the words of the United States Declaration of Independence, with one small, but significant word modification: “*All people* are created equal. They are endowed by their creator with certain inalienable rights; among these are life, liberty, and the pursuit of happiness.” Ho Chi Minh thus declared independence for Vietnamese women, who had been considered the property of their fathers, husbands, and sons. P. 46-47.


42 *Supra* note 40.


growth has beset the country with progress’ gifts and tragedies, including an increased standard of living, urbanization, convenience, over-exploitation of natural resources, cheap labor, residential overcrowding, unplanned land uses, decreased biodiversity, and polluted rivers, lakes, and groundwater aquifers.45

Prior to Doi Moi in 1986, the Vietnamese legal system was considered somewhat incomprehensible, as the state-subsidized mechanism that was not linked to a market economy limited political and economic progress.46 Moreover, environmental protection did not exist as a statutory issue, and regulations involving environmental protection were virtually nonexistent.47 Industrialization resulted in massive environmental degradation, and there were no real environmental legal tools in place to stem the destruction. After the Vietnam War, pressure to protect the environment increased, resulting in action on the part of the government to integrate environmental protection into the basic development plan of Vietnam.48 For example, the “regreening” of Vietnam of the 1980s, after massive destruction during the Vietnam by the chemical defoliant Agent Orange, was considered the “biggest challenge facing the country since unification,” and resulted in the planting of 500,000 hectares of trees.49 In the following years, the country furthered sustainable development policies including, the “National Plan on Environment

47 See id.
48 See id.
and Sustainable Development, 1991-2000”, and the National Strategy for Environmental Protection 2001-2010, as developed by the Vietnam Water Sector Review, which articulates objectives to prevent pollution, increase environmental quality improvement including water quality, and rational and sustainable resource management.⁵⁰

III. VIETNAM CONSTITUTION AND ENVIRONMENTAL LAW

A. Vietnam Constitution

There have been five versions of the Vietnam Constitution: 1946, 1959, 1980, 1992, and 2001 amendments to the 1992 version. The 1992 Constitution (unchanged in the 2001 version) fully embraced Doi Moi, and also emphasized environmental protection by stipulating the “entire people” “own” the natural resources, and those that “use the land” have a duty to “ensure its protection, replenishment, rational exploitation and economical utilization.”⁵¹ The document further articulates that all state offices, entities and citizens have to “observe” State laws on “appropriate utilization of natural resources and on environmental protection.”⁵² The document stresses a “rational use” of natural resources and prohibits “All acts ‘likely’ to bring about exhaustion of natural wealth and to cause damage to the environment.”⁵³ It does not address water quality per se.

B. Law on Environmental Protection

Environmental legislation in Vietnam has three prongs, notwithstanding the

⁵² See id. Article 29.
⁵³ See id.
Constitution: the Law on Environmental Protection (hereinafter “the LEP”), sector-specific laws and regulations, and provincial-community environmental laws and regulations. The most important is the LEP, which was passed by the National Assembly on December 27, 1993, came into effect on January 10, 1994, and was the first law passed specifically to protect the environment. Its corresponding agency, the National Environmental Agency (NEA), was established under the Ministry of Science, Technology and Environment (MOSTE) in 1993 to manage environmental protection.

At the time, water resource protection was not given much attention, as the document focused mainly on water development.

The LEP was subsequently amended in 2005, and like the Vietnamese Constitution, it issues a sweeping responsibility on business and ordinary citizens to protect the environment: “Organizations and individuals must protect water resources, water supply and drainage systems, vegetation, and sanitation facilities.” The LEP also places remedial responsibility on the polluter, “Any organization, family household or individual causing environmental pollution or degradation shall be obliged to remedy it and to compensate for loss and damage, and shall bear other liabilities in accordance with law.”

In one of many conflicting policy statements concerning environmental protection and economic growth, the LEP also frames water resource protection as a policy that must be managed in order to further economic development: “Environmental protection

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54 Vietnam Law on Environmental Protection, No. 52/2005/QH (the author was given a temporary membership through Vermont Law School to the only English source of Vietnamese laws, Allens Arthur Robinson at http://www.vietnamlaws.com/login.aspx?ReturnUrl=%2flaws%2fLw57na15Nov10EnvironmentalTax.pdf)
55 Supra note 46.
56 Vietnam Law on Environmental Protection, Article 15.
57 See id., Article 4(5).
must co-ordinate harmoniously with economic development and ensure social progress in
order to achieve national sustainable development. Protection of the national
environment must be associated with protection of the regional and global
environment."58

It follows that the United Nations Environmental Development (UNEP) reports
that the Vietnamese environmental framework does not meet the required baseline tasks
for environmental protection, and in general is “weak.”59 The United Nations Economic
and Social Commission for Asia and the Pacific also reports that several problems
contribute to ineffective environmental protection in Vietnam, including jurisdictional
overlap between ministries, inconsistencies between central government laws and
provincial laws, and a lack of clear rules and regulations that clarify procedural
requirements for each law.60 The UN states, “There is a crucial need for the LEP to be
harmonized with other laws [that] have a direct or indirect impact on environmental
protection.”61 For example, there is virtually no connection between the LEP and the
2011 Mining Law of Vietnam.62

IV. VIETNAM MINING POLICY AND LAW

A. The Law on Minerals

The Vietnamese government’s minerals policy began during Doi Moi, and in

58 See id., Article 4(1).
http://www.rrcap.unep.org/pub/soe/vietnam/overview/environmental_management_and_legislation.htm
60 Role of State in Implementing Environmental Protection Under the Vietnamese Law on Environmental
Protection, UNESCAP, Oct. 29, 2003 last update,
http://www.unescap.org/drpad/vc/orientation/legal/2D_std_vn3.htm
61 See id.
62 Vietnam Mineral Law, July 2011, (No. 60/2010/QH12); Arthur Allen Robinson at:
http://www.vietnamlaws.com. An electronic copy of the new law was obtained through Vermont Law
School on a trial membership basis.
1987 in accordance with the Constitution, the Law on Foreign Investment\textsuperscript{63} was passed, followed by the Ordinance on Mineral Resources in 1989. The Law on Minerals was passed in 1996, which replaced the 1987 Law on Foreign Investment and the 1989 Law on Mineral Resources.\textsuperscript{64} The Minerals Law has been amended twice since its inception, once in June 2005, and again in November of 2010,\textsuperscript{65} (hereinafter “New Minerals Law”) which superseded the 1996 law and 2005 amendments and took effect in July 2011.

The Ministry of Natural Resources and the Environment (MoNRE) is the central entity tasked with organizing mining and exports of minerals, and the control and revocation of mining licenses, especially those relating to: acreage, duration, processing, production, safety, and environmental protection.\textsuperscript{66} Each province has a localized Department of Natural Resources and Environment (DoNRE), which is responsible for mineral resource management.\textsuperscript{67} Vietnam’s mineral policy is formulated within the Department of Geology and Minerals of Vietnam, which studies and proposes amendments to legislation and policy supplements to State management of minerals.\textsuperscript{68}

The New Minerals Law has shifted away from specific environmental conservation policy language as set out in the previous version. The 1996 Minerals Law attempted to strike a balance between its desire to develop mineral resources and to protect the environment, and articulated a policy for rational, economical, and efficiently

\textsuperscript{63} Vietnam Law on Foreign Investment 1996, as amended June 9, 2000; http://www.vietnamlaws.com/freelaws/LFLna12Nov96(aa9Jun00)%5B11%5D.pdf
\textsuperscript{65} Vietnam Mineral Law, July 2011, (No. 60/2010/QH12); Arthur Allen Robinson at: http://www.vietnamlaws.com. An electronic copy of the new law was obtained through Vermont Law School on a trial membership basis.
\textsuperscript{66} MA Dinh Duc Truong, Institutional and Regulatory Context of Natural Resource Management in Vietnam, CONSULTANT REPORT SUBMITTED TO DANIDA, 23 (2007).
\textsuperscript{67} See id.
managed mineral resources for the purpose of “satisfying” industrialization and modernization, sustainability, and to maintain national defense and security, as well as “protect the environment and ecology.”

Article 3, the policy section of the New Minerals Law, now frames mineral development as socio-economic and national defense and security-centered, with no mention of environmental protection. However, despite this particular policy omission, environmental protection is mentioned superficially several times throughout the New Minerals Law document.

Water is addressed only briefly in the New Minerals Law in terms of water usage rather than protection, where mining companies are “entitled to use water resources in accordance with the law on water resources.” The document does address the “sources, volumes of and methods of using water and the release of waste water” during mining activities, though not in an environmental sense: they simply must be “specified in the exploration proposal, investment project, and mine design.”

The document requires mining companies to pay for all expenses to protect, reconstruct, or rehabilitate the environment, and those solutions and costs of protection, reconstruction or rehabilitation must be identified in the investment project, EIA report, and “written undertaking on environmental protection” that is approved by the relevant authority. The New Minerals Law also requires that escrow deposits for rehabilitation and reconstruction of the environment be arranged before mining commences.

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69 Supra Note 64 at Forward.
70 Supra Note 65, Article 3.1.
71 See id., Articles 4.1 and 30.1
72 See id., Article 32.1.
73 See id., Article 32.2
74 See id., Article 30.2
75 See id., Article 30.3.
B. Minerals Policy as Shaped by the Political Process

Vietnam’s conflicting policy stance is rooted in the processes of industrialization and geologic science. Since the relatively recent discovery of titanium\(^{76}\) and bauxite deposits in the Central Highlands,\(^{77}\) the government has taken a much more aggressive mining development trajectory that has shaped its mining policy, thus, impacting water quality and the environment as a whole. Prime Minister Nguyen Tan Dung declared the government’s goal to bring in more than $15 billion in investment in bauxite mining projects and aluminum refining by 2025 “a major policy of the party and the state.”\(^{78}\)

At a recent conference of scientists, concern for the environment in the midst of this mining policy was raised. Deputy Prime Minister Hoang Trung Hai articulated the government’s position this way: “Vietnam will not pursue the bauxite mining plan ‘at any cost,’” but noted that economic opportunity cannot be squandered.\(^{79}\) In April of last year the Minister of Natural Resources and Environment, Pham Khoi Nguyen, stated:

“Mining Has Merit: Three years ago we knew we had a proven 5.5 billion tons of bauxite in reserve and at present we can say that there are at least 11 billion tons. Our current reserve of titanium is 600 million tons. We can earn hundreds of billions of dollars if we sell crude ores and perhaps trillions if we process them here. Recently we discovered two deposits of rare metals. It is said that if we auction rights to mine ores containing lithium, we would get $500 million immediately.”\(^{80}\)


\(^{77}\) Supra note 13.

\(^{78}\) Supra note 8. In a controversial move, the government has awarded a subsidiary of a Chinese mining company, Chinalco, a permit to build the bauxite mine, and has awarded Alcoa, a U.S. company that specializes in aluminum mining, the right to conduct a feasibility study.

\(^{79}\) See id.

With such resources within grasp, and a burgeoning economy, it is understandable, and predictable, that water quality protection takes an ideological back seat to mining development.

V. VIETNAM'S WATER RESOURCES and REGULATORY FRAMEWORK

Vietnam is a water-rich country with exceptional surface and groundwater resources. Roughly 2,372 rivers are over six miles long and deposit over a trillion cubic feet of water every year, 109 of which are main transportation arteries. Watershed basins cover approximately 600,000 square miles, and there are 13 river basins that comprise areas over 6,000 square miles. Many of Vietnam’s natural lakes, ponds, and lagoons have been drained or filled as a result of industrialization and population growth, but it is estimated that the remaining number of such waterbodies covers 150,000 hectares. The country is ranked as a world leader in rainfall at an estimated 6.4 billion cubic feet per year.

Vietnam is also experiencing a shortage of water due to pollution and industrialization. All major watersheds throughout the country are polluted, and do not meet adequate drinking standards. Moreover, there are five major watersheds that are

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82 See id.

83 See id.

84 See id.

classified as “alarmingly polluted”: the Mekong, Red and Dong Nai, Vu Gia, and Ca.  

Because of the deteriorating health of fresh water resources, Vietnam is ranked 127th out of 146 countries in terms of overall environmental health behind Laos, Cambodia, and Thailand, according to the Environmental Sustainability Index. This is due, in part, to weak and inconsistent water laws and regulations. In light of environmental reforms, Vietnam’s ability to mitigate ecosystem pollution and degradation, and to manage water quality, has increased in understanding, but decreased in target success.

A. Law on Water Resources History and Regulatory Scheme

Pursuant to the Constitution, the Law on Water Resources (hereinafter “LWR”) was promulgated on May 20, 1998 and passed in January 1999. The implementation guidance decree was promulgated on December 30, 1999. The LWR was crafted by the Ministry of Water Resources, which is now part of the Ministry of Agriculture and Rural Development, or MARD. In December of 1999 the law’s corresponding agency, the National Water Resources Council, was created, which advises the government on national and international water policy issues, and settles water disputes among

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provinces, cities, and agencies.\textsuperscript{91} At the same time, the River Basin Planning Management Organizations were created to help manage the Mekong, Dong Nai, and Red River basins.\textsuperscript{92}

The LWR is a rather comprehensive document and is notable for its breadth of statements, rules, and initiatives to thwart water pollution and protect water quantity and quality. There have been several additions to the LWR in the form of governmental decrees, circulars, and decisions that have set in motion a multi-faceted network of water resource and water quality management.\textsuperscript{93}

The LWR provides an ideological framework for the protection and exploitation of water resources in Vietnam, but falls short of matching policy goals even within the context of the document. For example, on the one hand the LWR states: “Water is a natural resource of special importance, the essential component of life and the environment…” and, water is “owned” by the people of Vietnam, under the management of the State,\textsuperscript{94} ergo the People’s Councils and People’s Committees.\textsuperscript{95} The “Fatherland Front” (social organizations) has the responsibility to supervise implementation and “popularize” water resource legislation.\textsuperscript{96} On the other hand, the government allows industry the opportunity to totally disregard environmental provisions of the LWR if

\textsuperscript{92} See id.
\textsuperscript{93} In addition to the laws already covered, these important laws and were developed to strengthen environmental protection and water resources protection: the Law on Fisheries (2003), Ordinance on Exploitation and Protection of Irrigation Works (2001), the Law on Inland Waterway Navigation (2004), the Law on Land (2003), the Law on Tendering (2005), the Law on Dykes (2006.). \textit{See Supra} note 46 at 13.
\textsuperscript{94} LWR, Article 1.1
\textsuperscript{95} LWR, Article 4.3
\textsuperscript{96} LWR Article 4.4
another law allows water “exploitation” in a certain waterbody. In reality, the government has not allocated the financial resources necessary to develop water protection regulations, so has relied to a degree on international funding and partnerships with NGOs to achieve what it has accomplished so far.

B. Discharges and Water Quality Standards

The government has attempted to institute safeguards for water quality under the LWR, and frames water quality protection within the context of socioeconomic development. Government Decree and the LWR govern discharges, and water resource extraction, exploitation, and utilization. The LWR sets out broad demands for water quality protection that target chemical discharges from agriculture, aquaculture, mining, and industry, which “must not cause pollution of the water source.” Toxic discharges and untreated wastewater that do not meet permissible standards into water sources are forbidden.

Agencies that manage water resources at the State level must inform related branches at lower levels the capacity of water resources based on river basins and actual potential, for the calculation of water uses. Lower agency levels are responsible for

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97 LWR, Article 24.2(dd).
99 LWR, Articles 13 and 14.
100 Supra note 46 at 36: (No. 149/2004/ND-CP of July 27, 2004 and MONRE’s Circular No. 02/2005/TT-BTNTM, issued on June 24, 2005.)
101 LWR, Article 15.
102 See id.
103 LWR Article 13 and stipulated by Decree No. 179/1999/ND-CP.
104 Supra note 46 at 33: citing Government Decree No. 179/1999/ND-CP.
adjusting the uses to the actual waterbody capacity. People’s Committees at provincial level organize inventories, evaluations, and surveys of water resources in their jurisdictions.

Signaling the embrace of a water quality standard, as in the United States, industries and mining operations “must not discharge” unprocessed wastewater, and processed wastewater must be up to the permissible standards for the waterbody. MoNRE is the ministry responsible for setting and publishing water quality standards, and it formulates and promulgates national technical standards and regulations for water resources. These standards are adjusted every five years.

To get a baseline for regulation, Vietnam embraces what the United States calls a “technology-based standard,” that determines the highest level of effluents that are acceptable in a waterbody without regard to the waterbody’s special characteristics.

C. Discharge Permits

The LWR’s Article 18 addresses discharge permits. Under the LWR, entities that use and exploit surface and groundwater water resources must apply for permits except for: domestic use, water used for “small industry,” or water already assigned or leased.
according to the Law on Land, this law, or other laws.\textsuperscript{111} Wastewater utilized in mining production requires a permit that is based on the water body’s discharge capacity.\textsuperscript{112}

The management of discharge permits in Vietnam is largely community-based, rather than central government-based. Toxic and wastewater discharges require a permit issued by MoNRE, and People’s Committees manage and oversee the permits.\textsuperscript{113} People’s Committees have the authority to cancel or invalidate permits based on violations of the permit, transfer of the permit without permission, or misuse of the permit.\textsuperscript{114} Permits are valid for three to five years, and may sometimes be granted a three-year extension.\textsuperscript{115}

Obligations on the part of dischargers are “to process wastewater in order to reach the permissible criteria before discharging wastewater” into the waterbody,\textsuperscript{116} to pay for damage if they violate prescriptions on the discharge of wastewater,\textsuperscript{117} and to pay for the issuance of the permit, and for discharging waste into water sources.\textsuperscript{118} The LWR further orders industry and mining operations that exploit and use water to “save water.”\textsuperscript{119} Such entities are encouraged to use running water, re-use water and “must not cause pollution” affecting the water resource,\textsuperscript{120} and must treat the water before returning it back to its source.\textsuperscript{121} Polluters are given compensatory rights if the discharge location changes,\textsuperscript{122}

\textsuperscript{111} LWR, Articles 18, 24.2, 24.2(b), and 24.2(d). It is safe to assume that “small industry” comprises a large percentage of Vietnam’s business sector, which begs the question of how much water use and contamination are per se regulatable?
\textsuperscript{112} LWR Articles 18.1 and 18.2 respectively.
\textsuperscript{113} Supra note 46 at 60: citing Article 18 of the LWR and Govt. Decree No. 170/1999/ND-CP.
\textsuperscript{114} See id., citing Art. 6 of Govt. Decree 149/2004/ND-CP.
\textsuperscript{115} See id.
\textsuperscript{116} See id., citing LWR, Article 19.2(a).
\textsuperscript{117} See id.
\textsuperscript{118} See id., Article 19.2(b).
\textsuperscript{119} See id., Article 28.
\textsuperscript{120} See id., Article 28.1
\textsuperscript{121} See id., Article 28.2
\textsuperscript{122} See id., Article 19.1(a)
and they can initiate lawsuits on acts that infringe upon their rights to pollute.¹²³

D. Other Methods to Protect Water Quality

Over time Vietnam has constructed various strategies and programs to protect water quality in addition to the LWR; for example, the National Target Program for Clean Water and Environmental Hygiene in Rural Areas¹²⁴ and Orientation for the Development of Urban Drainage in Vietnam up to the Year 2020¹²⁵. Additionally, the National Strategy on Environmental Protection till 2010 and Orientation Towards 2020 and the National Strategy on Water Resources to 2020 were created to end the exploitation and contamination of water resources, and the discharge of toxic chemicals from industry and agricultural production into waterbodies without permission by relevant authorities.¹²⁶ The Prime Minister signed the latter in 2006 that sets out recommendations to “strengthen the protection, exploitation, use and development of water resources, as well as the prevention and mitigation of adverse impacts caused by water.”¹²⁷ Recommendations include integrating legislation, increasing investment in water quality improvement and pollution mitigation, and development of human resources and science technology in order to depart from inadequate industrial practices that harm water resources.¹²⁸

To assess environmental standards of different sectors country-wide, including water, the Law on Environmental Protection (LEP) created an initiative called the

¹²³ See id., Article 19.1(b) and Article 69
¹²⁵ See id., citing Decision of the Prime Minister No. 35/1999/QD-TTg.
¹²⁶ See id., at 34, citing Decision of Prime Minister No. 256/2003/QD-TTg, Dec. 3, 2003, and Prime Minister’s Decision No. 81/2006/QD-TTg on April 4, 2006.
¹²⁸ See id., at 19.
National Environmental Monitoring Network (hereinafter Network).\textsuperscript{129} The Bureau of Water Environment Management is responsible for state management activities relating to water environment management, including national water quality monitoring.\textsuperscript{130} As of 2002 the Network consisted of 21 stations based in 45 provinces, which monitored 250 “hot spots” or cities, industrial zones, ecologically sensitive areas for the quality of water, air, coastal areas, noise, land, acid deposition, radioactivity and indoor working environment.\textsuperscript{131} The goal is to establish 61 sampling stations where data are collected every six months by the Office of Data and Information under the Vietnam Environmental Protection Agency (VEPA), and reported to the DoE, who publishes the annual State of the Environment Report for the National Assembly.\textsuperscript{132}

VI. ENFORCEMENT

A. The Environmental Police Department

Vietnam has not devoted sufficient resources and capacity to regulatory regimes with regard to mining pollution rehabilitation and reconstruction, thus has left it to the discretion of the investor-owner to know the law and self-regulate in many instances. Further, corruption is common in Vietnam because its regulatory and enforcement bodies are receptive to influence by well-connected and powerful people.\textsuperscript{133} To support development, studies and initiatives are commonly recalibrated to favor investors and government profits.\textsuperscript{134}

\textsuperscript{129} LEP Ch. 11 Articles 8-12.
\textsuperscript{130} Supra note 98.
\textsuperscript{131} Water Quality Monitoring Systems, WATER ENVIRONMENT PARTNERSHIP IN ASIA 2002, at: \url{http://www.wepa-db.net/policies/enforcement/monitoring/vietnam.htm}.
\textsuperscript{132} See id.
\textsuperscript{133} Supra note 44 at 26.
\textsuperscript{134} See id.
The problem is a lack of political will and enforcement infrastructure. From 2009 to 2010 the Vietnam Environment Administration reported that the number of environmental violations issued by the Vietnam Environmental Police Department (EPD) had increased 43 percent nationwide to more than 6,500 LEP violations, and only 88 of them resulted in lawsuits.\footnote{Environmental Violations Soar 43\%, Vietnam Environmental Administration, 2010, at: \url{http://vea.gov.vn/en/laws/LegalDocument/Pages/Environmentalviolationssoar43.aspx}.} Perhaps as a symbolic gesture toward environmental protection, the government issued fines over VN 17 billion, or US $895,000 for those violations.\footnote{Environmental Violations Soar, VIETNAM NEWS, June 21, 2010, at: \url{http://vietnamnews.vnagency.com.vn/Environment/200731/Environmental-violations-soar.html}.}

In a Vietnamese Embassy cable that was declassified and released on September 6, 2007, it was revealed that the EPD, established in 2006 under MoNRE to target environmental violations throughout Vietnam, does not operate effectively due to the lack of understanding of the mechanics of environmental enforcement, the lack of investigatory training, and the lack of environmental regulations.\footnote{Vietnamese Embassy cable: “Vietnam’s Nascent Environmental Police Department Lacks Capacity to Fulfill Mandate,” created on 9/26/07 and released on 8/30/11 at: \url{http://wikileaks.org/cable/2007/09/07HANOI1706.html}.} The cable also described the absence of experience the judiciary has in environmental jurisprudence, and the need for an environmental court.\footnote{See id.} The cable closes by asking for United States’ assistance in refining these issues through the Environmental Protection Agency (EPA) and Department of Justice.\footnote{See id.}
B. Environmental Protection Fee

The LWR states that illegal uses of water are “strictly forbidden,”140 and, those who cause harm shall be “disciplined” “fined” or suffer penal punishment.141 Polluters are given compensatory rights if the discharge location changes,142 and they can initiate lawsuits on acts that infringe upon their rights to pollute.143 To meet these policy statements, the Vietnamese government imposed an “environmental protection fee,” or fine, on entities that pollute waterways with wastewater in 2003.144 Fines are imposed on companies, including mines, which dump wastewater and toxic effluents illegally into waterways or other illegal locations. In addition to a fine, violators may be subject to license revocation and restitution of the environment. The repository for these fees is called the Vietnam Environment Protection Fund (VEPF), which is administered by MoNRE.145 The VEPF also takes deposits from permitted mining operations for environmental rehabilitation in mining exploration, and is a co-sponsor for soft loans for environmental projects.146

It’s not clear whether the fee is working to thwart polluters, for in March 2009, MoNRE requested an increase in the fee for industrial polluters, such as mines.147 Later that year, the government responded by increasing the fine by Decree up to VND 500

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140 LWR, Article 9.
141 LWR, Articles 71.1 and 71.2.
142 LWR, Article 19.1(a).
143 LWR, Article 19.1(b) and Article 69.
145 Vietnam Environmental Protection Fund at: http://vepf.vn/Home, Decree No. 67/2003/ND-CP.
million, or approximately $27,000, which is not a significant deterrent for huge mining conglomerates to stop discharging toxic waste into the environment.\textsuperscript{148} In many cases it is financially beneficial to simply pay the fines and pollute rather than upgrade equipment and methods of extraction in order to protect water quality.

C. Environmental Impact Assessments

Environmental Impact Assessments, (hereinafter “EIAs”) are a precautionary tool to prevent pollution into the environment before a project commences, so are not an enforcement mechanism per se, but they play an important role in the enforcement process in that they scientifically document a baseline for the present conditions of the surrounding water quality and ecology in order to predict environmental and societal impacts. EIA’s in Vietnam have been a requirement since the inception of the LEP in 1994. The LEP requires that all investment properties must submit an EIA report to the State management agency for environmental protection.\textsuperscript{149}

The Vietnamese government borrowed EIA principles from several developed nations, including the United States’ National Environmental Protection Act (NEPA). The purpose of the EIA under NEPA was to help determine the “probable environmental consequences” for government agency projects, and to “broaden and strengthen the role of foresight in governmental planning and decision making.”\textsuperscript{150}

Under the 1996 Minerals Law, and like the United States, an EIA report is

\textsuperscript{149} LEP, Articles 17 and 18.
required in order to obtain a mining license.\textsuperscript{151} The new Minerals Law orders mining companies to include solutions and costs of protection, and reconstruction or rehabilitation plans within EIA’s.\textsuperscript{152} As well, a mining project must submit an environmental restoration plan, and must deposit money for that purpose into a government fund.\textsuperscript{153}

Due to the lack of political regulation and capacity to enforce the EIA’s provisions, Vietnam has taken substantial foreign aid to build such capacity and carry out its objectives.\textsuperscript{154} Foreign aid to Vietnam for EIA assistance has spanned from large programs involving many stakeholders, millions of dollars, and over many years, to small collaborations including a 6-month UNEP/IUCN project to publish an EIA guidebook.\textsuperscript{155} There is very little empirical research documenting the effectiveness of such foreign aid projects. Some reports have found that EIAs that are carried out only meet the minimal government requirements, environmental issues are only mentioned in general terms, provisions are not monitored closely, and rehabilitation projects and environmental restoration plans are not always included into the EIA.\textsuperscript{156} Moreover, public participation in the planning exercise is considered a time consuming, unnecessary, and inefficient process, and also politically dangerous by the Vietnamese government.\textsuperscript{157} Thus, EIA’s are used as a mitigation tool rather than a tool to create an environmental strategy in developing countries such as Vietnam.

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\textsuperscript{151} New Minerals Law, Article 53.2(b). The Law on the Environment requires facilities to prepare environmental impact reports, including monitoring and mitigation plans, LEP Article 17.
\textsuperscript{152} New Minerals Law, Article 30.2.
\textsuperscript{153} Kate M. Lazarus, \textit{In Search of Aluminum: China’s Role in the Mekong Region}, Heinrich Boll Stitung and partners, p. 29 (2009).
\textsuperscript{154} \textit{Supra} note 44 at 285.
\textsuperscript{155} \textit{See id}.
\textsuperscript{156} \textit{Supra} note 153.
\textsuperscript{157} \textit{Supra} note 150 at 26.


D. Natural Resource Tax

In accordance with the 1992 Constitution, the Standing Committee of the National Assembly promulgated the Ordinance on Natural Resource Tax on April 16, 1998, supplanting the 1990 version.\textsuperscript{158} The ordinance places a tax on all individuals and organizations that exploit natural resources, including water, except in cases where a Vietnamese company in a joint venture with a foreign company makes capital contributions under the Law on Foreign Investment.\textsuperscript{159} Natural resources that are the subject of taxation are: natural water, including surface water and groundwater\textsuperscript{160} natural aquatic resources, metallic and non-metallic minerals, natural mineral water and thermal water, petroleum, gas, and products of natural forests.\textsuperscript{161}

Vietnam faces many challenges in its quest for environmental and water quality health, including the benchmark of legislative success: the ability to create capacity for a plan, and the ability to enforce environmental and water quality laws and regulations.

THE UNITED STATES

I. THE UNITED STATES’ MINING HISTORY AND FRAMEWORK

A. US Mining History and Environmental Consequences

When one reads of Vietnam’s minerals policy and modern mineral boom, it harkens back to the Gold Rush in California and the western United States. Vietnam is, in fact, experiencing many of the same growing pains that the United States experienced in the mid to late 19\textsuperscript{th} century due to mining development. When gold was discovered in

\begin{footnotesize}
\begin{enumerate}
\item[158] Supra note 46 at 24, citing No 05/1998/PL-UBTVQH10.
\item[159] See id.
\item[161] See id.
\end{enumerate}
\end{footnotesize}
California in 1848, a new era of expansionism and opportunity opened up in the U.S., as well as a new era in environmental pollution. President James Polk stated in his State of the Union speech later that year, the “accounts of the abundance of gold…of such an extraordinary character as would scarcely command belief…”162

The U.S. government capitalized on the prospect of gold discovery to encourage western expansionism, and to fulfill the goal of Manifest Destiny— the belief in the divine purpose of the U.S. to own and occupy the land between the east and west coasts. Gold mining operations in California in 1849 started with individual prospectors, and grew to large corporate enterprises, seemingly overnight. Companies built large dredgers in streams and rivers, or fired enormous water cannons onto hillsides, to expose gold.163 Mining companies also build huge systems of underground mines throughout the west that discharged large amounts of mercury-laden sludge into western waterways.164

Since then, mining in the U.S. has developed into a multi-billion dollar industry. For example, in 2007 the U.S. developed approximately 240 tons of gold, which made it the fourth largest gold producer in the world, behind Australia, South America, and China.165 The US domestic gold mining industry creates roughly 66,000 jobs and nearly $2 billion in annual earnings; the US is also the leading producer of molybdenum,

164 See id.
gypsum, and beryllium in the world.\textsuperscript{166} Mining has been a significant factor in the United States’ economic development and history, but with a large environmental cost. In the contiguous United States, there are an estimated 200,000 abandoned hard rock mines nationwide,\textsuperscript{167} and the number of operating mines varies between 2,000 and 10,000 at any given time.\textsuperscript{168} Copper and gold mines make up 80 percent of the mining facilities in the U.S.\textsuperscript{169}

Regulation of the mining sector requires involvement from every major EPA program,\textsuperscript{170} as mining operations discharge more waste\textsuperscript{171} and toxic substances into surface waters and the environment than any other industry.\textsuperscript{172} States differ in controls, land use issues, environmental issues, and the type of mining proposed, which makes every mine and its particular set of regulations, unique. Since there is no federal law that addresses mining impacts on the environment, many states have promulgated statutes that do, or have implemented federal environmental programs such as the Resource Conservation and Recovery Act (RCRA) and the National Pollutant Discharge Elimination System (NPDES) under the Clean Water Act.\textsuperscript{173}

\textsuperscript{166} See id.
\textsuperscript{168} Wastewater Primer, US ENVIRONMENTAL PROTECTION AGENCY 6, May 1998.
Part of the regulatory problem of mining pollution in the U.S. is due to the antiquity of the mining statute and mining policy.

B. The U.S. Mining Policy and Mining Law of 1872

Unlike Vietnam’s New Mining Law of 2011, the United States Mining Law (hereinafter “Mining Law”, or “law”) pertains to hardrock minerals, oil, and natural gas on federal land, and has remained unchanged since its inception in 1872.174 The law was written to encourage western U.S. settlement by allowing prospectors (including large corporations) who find minerals on federal lands, such as gold, to stake minerals and land claims and obtain a patent for a land title.175 Once these requirements are fulfilled, the prospector is granted the claims as private property.176 The US government essentially says to mining prospectors and companies, “Come and get it for free.”177

The US Congress declares that the policy of the Federal Government “in the national interest is to foster and encourage private enterprise in the development of economically sound and stable domestic mining, minerals, metal and mining reclamation industries,”178 and to underscore this, Interior Secretary Ken Salazar recently stated, “Our domestic gold mining industry alone creates more than 66,000 jobs and nearly $2 billion

174 US Mining Law, 30 U.S.C. §22 et. seq
175 See id., 30 U.S.C. § 29
176 See id., 30 U.S.C. § 23; the provision states, “No location of a mining claim shall be made until the discovery of the vein or lode within the limits of the claim located.” CHRISTINE A. KLEIN, Supra note 602 at 448. Presently, the Mining Law’s claim provisions apply to 19 states: AK, AR, CA, CO, FL, ID, MS, MT, NE, NV, NM, ND, OR, SD, UT, WA, WY: (BLM Mining Claims p. 11, at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS_REALTY_AND_RESOURCE_PROTECTION_/energy.Par.28664.File.dat/MiningClaims.pdf The federal government owns nearly 650 million acres of land, amounting to nearly 30 percent of the US landmass. To this day, a mining claim is treated as a right to mine, and mining proposals are usually granted; however, Congress has limited the reach of new mining claims on federal lands, including most designated wildernesses (16 U.S.C. § 1133(d)(3) and most national parks. (See Brown v. Dep’t of Interior, 679 F.2d (1982).
178 Mining Law, 30 U.S.C. § 21a(1)
in annual earnings annually…. In my view, our own security depends on maintaining a viable domestic mining industry. Metals and minerals are also needed to support development of renewable energy.”  

Due to the Mining Law’s antiquity and related problems, there have been calls to reform it to accommodate the environment, mandate a mineral royalty for hardrock mining companies, and eliminate the patent provision. In the same 2009 speech to the Senate, Interior Secretary Ken Salazar informed the panel that the Obama administration intended to reform the Mining Law. The revised form of the Mining Law is called the Hardrock Mining and Reclamation Act, and passed a U.S. House of Representatives vote in 2007, but has yet to pass a Senate vote and become law.

II. WATER POLLUTION REGULATION

The modern environmental movement in the United States began with air and water quality protection. The United States has a complex and well-developed legal and regulatory system that governs water pollution in the nation’s waters. A treatment of every important aspect of U.S. water protection is not conducive to this paper; however, there are several areas of law and regulation that will be addressed as they relate to mining pollution of surface waters.

A. US History of Water Protection

During the United States’ industrialization period and gold rush from approximately 1820-1920, industrial and mining sludge discharges into waterways and

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179 Supra note 165.
180 See id.
coastal areas went virtually unchecked and unregulated, causing unprecedented pollution in mountainous areas of the west and Appalachia and most cities. By the end of the 19th century, a vague awareness of the plight of polluted waterways reached Congress. In 1899 the Rivers and Harbors Act was passed by Congress,\textsuperscript{182} which prohibits the construction of any bridge, dam, dike or causeway over or in any navigable water of the United States.\textsuperscript{183} Although the law didn’t address pollution per se, it did set in motion the legal progeny of water protection.

Nearly 50 years later, the federal government initiated its role in protecting waterways from pollution and protecting public health by passing the 1948 Federal Water Pollution Control Act (FWPCA).\textsuperscript{184} In 1965 Congress passed the Water Quality Act, which required states to develop water quality standards for interstate waters by 1967, and by the early 1970s all the states had adopted water quality standards.\textsuperscript{185}

In 1970, President Richard Nixon created the Environmental Protection Agency\textsuperscript{186} in order to enforce environmental protection and curb federal pollutant activities. Also in 1970, President Nixon signed an Executive Order that created the Refuse Act Permit Program\textsuperscript{187} under the Rivers and Harbors Act, which established a permitting plan to controlling industrial water pollution.\textsuperscript{188} In 1977, the Clean Water Act was passed,

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\textsuperscript{184} Federal Water Pollution Control Act, 63 U.S.C. 1155 (1948).
\textsuperscript{186} Environmental Protection Agency Reorganization Plan No. 3: http://www.epa.gov/history/org/origins/reorg.htm (Congress later enacted the plan in Public Law 98-164).
\textsuperscript{187} See id., and (EO 11574); and Refuse Act 33 U.S.C. §§407 et.seq., which imposes a criminal liability for discharging refuse into any navigable water if not sanctioned by permit from the Secretary of the Army.
\textsuperscript{188} Rivers and Harbors Act, 33 U.S.C. §407 (1899). The Refuse Act Permit Program (EO No. 11,574) Section 407 gave the Secretary of the Army and EPA the power to issue permits for discharges from industry into navigable waters. For further information, see: W.H. Rogers, \textit{Criminal Liability Under the
amending the Federal Water Pollution Control Act, and in 1987 a brand new Water Quality Act was passed, supplanting the 1965 version.\textsuperscript{189} This foundation gave the EPA power to regulate pollution discharges into navigable waters, with the policy goal of “restore and maintain chemical, biological, and physical integrity of the nation’s waters”\textsuperscript{190} and to eliminate pollutants into the navigable waters by 1985.\textsuperscript{191}

When the Clean Water Act went into effect, the U.S. was in a period of environmental awakening in response to Rachel Carson’s book \textit{Silent Spring}, a seminal work warning of the dangers of toxic pollutants in our waterways and environment, namely DDT.\textsuperscript{192} The Clean Water Act was the progeny of political pressure that culminated because of heightened awareness generated from Silent Spring, and “establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters.”\textsuperscript{193}

Although the CWA’s main focus is to maintain and improve water quality for human use and consumption, it also helps protect biodiversity, namely endangered species, in several different ways. The first is setting water quality standards the meet Endangered Species Act instream flow requirements for endangered species,\textsuperscript{194} and the antidegradation policy requires existing uses of a waterbody are protected, such as threatened or endangered species.\textsuperscript{195} The CWA also limits discharges and fill into

\textsuperscript{190} CWA §101(a)
\textsuperscript{191} CWA §101(a)(1)
\textsuperscript{192} RACHEL CARSON, SILENT SPRING (Houghton Mifflin Co. 1962).
\textsuperscript{193} Summary of the Clean Water Act, US ENVIRONMENTAL PROTECTION AGENCY, \url{http://www.epa.gov/lawsregs/laws/cwa.html}
\textsuperscript{194} Id., CWA §303
\textsuperscript{195} Understanding the Clean Water Act, RIVER NETWORK, \url{http://www.rivernetwork.org/rn/cwa/other-laws}
wetlands, which are hotbeds of biodiversity.\textsuperscript{196} And, finally, the CWA issues NPDES permits to discharge in waters containing biodiversity, which is based in part on criteria to maintain current or higher levels of aquatic life.\textsuperscript{197}

There are four sections of the CWA that are relevant to our purposes and that are related to water quality: (1) water quality standards for all contaminants in surface waters, (2) minimum national effluent standards for each sector of industry, (3) a discharge permit program that coordinates water quality standards into enforceable limits, (4) toxic chemical regulation, including those generated by mining operations. All coincide with Vietnam’s LWR’s Articles 13 and 15, except national effluent standards.

\textbf{B. Water Quality Standards}

To achieve the EPA goal to “restore the nation’s waters”, the CWA mandates that “a discharge without a permit by any person of any pollutant into navigable waters from a point source shall be unlawful.”\textsuperscript{198} Discharges of pollutants are not defined per se, but the CWA categorizes them as “conventional,”\textsuperscript{199} (total suspended solids, pH, fecal coliform, oil and grease) “nonconventional,”\textsuperscript{200} (ammonia, nitrogen, phosphorous, BOD, effluent toxicity) or “toxic”\textsuperscript{201} (metals and manmade compounds). Mining pollution can fall into any category. All toxic and nonconventional pollutants must be controlled through the use of best available technology in an industrial category, or BAT\textsuperscript{202}, and the EPA must consider core factors listed in the CWA, such as the age of equipment and

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\textsuperscript{196} CWA §404
\textsuperscript{197} CWA §402
\textsuperscript{198} CWA §301 and §303.
\textsuperscript{199} CWA §304(a)(4)
\textsuperscript{201} CWA §307(a)(1)
\textsuperscript{202} CWA §304(b)(1)(A)
facilities, the engineering aspects of the application of different control techniques, the process employed, non-water quality environmental impacts and energy requirements and other factors that the Administer “deems appropriate.”

When an applicant wishes to obtain a National Pollutant Discharge Elimination System (hereinafter “NPDES”) Section 402 permit to discharge into a waterway, or a Section 404 permit for discharges into wetlands, it must apply for a Section 401 permit from the state or tribe who had jurisdiction over the waterbody. Numerous issues are taken into consideration, including water quality standards for a waterbody, which define the water quality goals and are the bedrock of the EPA water pollution control program.

Water quality standards are based on designated uses, water quality criteria to support the designated uses, and an anti-degradation policy. If the water quality for that waterbody is consistent to, or better than, federal requirements, then the applicant is granted a Section 401 permit by the state for submission to the relevant federal agency, who will then grant a Section 402 or 404 permit. The CWA directs the EPA to publish water quality criteria guidance documents to help States develop their own water quality standards. Criteria for water quality, or data and scientific assessments on concentrations of pollutants and human health and environmental effects, are required

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203 CWA §304(b)(2)(B)
205 CFR §131.10
206 CFR §131.11
207 CFR §131.12
208 CWA §304(a)(1) and 33 CFR §1313(b)(1). The 1987 Water Quality Act (§. 304(m) requires that the EPA publish a biennial plan for developing new effluent guidelines and a schedule for the annual review and revision of existing promulgated guidelines. http://cfpub.epa.gov/npdes/techbasedpermitting/effguide.cfm)
and must be scientifically up-to-date.\textsuperscript{209} The state or tribe will then assess waterbodies to determine whether they have reached the standards, and submit it to Congress.\textsuperscript{210} Once a state has incorporated federal water quality standards, or stricter standards, into their water quality framework, it will receive certification from the EPA to issue NPDES permits.\textsuperscript{211}

There are two levels of water quality standards within the CWA framework: a “technology-based” standard, which is the lowest possible standard a navigable waterbody can have and meet national pollutant requirements, and a “water quality standard,” which is a higher and more exacting standard.

\section{1. Technology-Based Regulation}

Technology-based effluent limits,\textsuperscript{212} or the technology-based standard, is the baseline standard used in the U.S. to determine the highest acceptable level of pollutants allowable in each waterbody in order to meet its designated uses, without regard to individual specifications of each waterbody. A discharging entity must use effluent guidelines\textsuperscript{213} that are economically achievable to adhere to effluent standards as set out by the EPA or by States’ water quality policies,\textsuperscript{214} while using “any available control technique” to meet the limits.\textsuperscript{215} For industrial facilities such as mines, technology-based effluent limits are obtained by using effluent limitation guidelines and standards from the

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\begin{enumerate}
\item CWA §304(a)(1), and \textit{Surface Waters Standards and Guidance}, US ENVIRONMENTAL PROTECTION AGENCY, \url{http://water.epa.gov/scitech/swguidance/}
\item CWA §305(b)
\item CWA §401 certification.
\item CWA §304(b)
\item \textit{Effluent Limitations Guidelines and Standards}, US ENVIRONMENTAL PROTECTION AGENCY, \url{http://cfpub.epa.gov/npdes/techbasedpermitting/effguide.cfm}
\item 40 CFR 122.44(d)
\item \textit{Water Quality and Technology-Based Permitting}, US ENVIRONMENTAL PROTECTION AGENCY, \url{http://cfpub.epa.gov/npdes/generalissues/watertechnology.cfm}
\end{enumerate}
\end{footnotesize}
EPA, and/or using the best professional judgment in each discharge case, when there are no national guidelines or standards.\textsuperscript{216} The EPA Office of Science and Technology is responsible for developing and updating effluent limitations guidelines and standards.\textsuperscript{217}

2. Water Quality-Based Regulation

When technology-based effluent limits do not meet State water quality standards, or when toxic pollutants are found in a waterbody,\textsuperscript{218} a water-quality based effluent limitation must be imposed that protects state water quality standards.\textsuperscript{219} Water quality-based standards are more exacting than effluent limitations in that the permit writers must take into account the potential impact of each possible surface water discharge on the water quality of that waterbody.\textsuperscript{220} The water quality-standard takes a holistic view of the uses and value of the waterbody, and is the basis of the water quality-based pollution control program, which is mandatory under the CWA.\textsuperscript{221}

When standards are set, the CWA requires states and Indian tribes to assess and develop a list of impaired waters, or waters that do not meet water quality standards because it is too polluted or degraded, within its jurisdiction.\textsuperscript{222} The impaired waters are ranked in order of severity of pollution.\textsuperscript{223} For more severely impaired waters, the CWA requires the application of Total Maximum Daily Loads (or TMDL’s), which is the

\begin{flushleft}
\textsuperscript{216} See id.
\textsuperscript{217} CWA § 306(a)
\textsuperscript{218} 40 CFR 122.44(d)
\textsuperscript{219} CWA §303(b)(1)(c) and 40 CFR 131.15
\textsuperscript{220} Supra note 213 and 215.
\textsuperscript{222} CWA §303(d)
\end{flushleft}
amount of a pollutant from point, nonpoint, and natural sources that can be safely discharged into a waterbody without affecting it’s designated uses. 224 TMDL lists are required every two years for impaired water bodies. 225 Pollution exceeding the TMDL will usually cause waterbodies to exceed water quality standards. 226 States or tribes must allocate loads and waste loads for point and nonpoint sources under each TMDL, taking into account water temperature, flow rates, seasonal variations, heat sources, and dissipative capacity of identified waters. 227 If the water body meets the State water quality standards, it may be removed from the 303(d) list of impaired waters that require TMDLs. 228 If the water quality standards are not met, the load and waste load and TMDL must be modified. 229 To ensure compliance with the TMDL, the EPA conducts inspections of facilities, which includes the review of discharge monitoring report, personnel interviews, and wastewater samples into navigable waters. 230

Vietnam currently employs a technology-effluent-based standard of pollution control in its statutory language. Vietnam’s policy statements and work with international organizations in some of its larger watersheds suggest a desire to

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224 CWA §303 (d)(1)(C).
225 CWA §303(b)(1)(c) and 40 CFR 131.15
226 Supra note 213.
227 CWA §303 (d)(1)(D)
229 See id. In 2007, the Carolta Mining Company in Arizona proposed to build an open pit copper mine and discharge pollutants into Pinto Creek, an impaired waterbody. Carlota applied for an NPDES permit under section 402 of the CWA, which was issued by the EPA, and challenged by environmental groups. The Ninth Circuit ruled that no permit may be issued to a new source of pollutant or discharger if the discharge will cause or contribute to the violation of water quality standards. There is an exception if the TMDL permit applicant can show that a TMDL has been established and there are sufficient remaining permit load allocations to allow for the discharge, and the dischargers are subject to compliance schedules that bring the discharge segment into compliance with water quality standards. Friends of Pinto Creek v. United States Environmental Protection Agency, 504 F.3d 1007 (9th Cir. 2007).
230 Supra note 223.
incorporate an integrated watershed management philosophy with water quality-based standards for its major surface waterbodies.

C. NPDES Section 402 Permit Program

If any discharging entity, a mine for example, plans to discharge treated water or toxic chemicals into waters of the United States from a point source, it must apply for a CWA Section 402 National Pollution Discharge Elimination System permit (NPDES). An NPDES permit applies only to point source discharges. A point source is defined as a “discernable, confined, and discrete conveyance,” which includes a pipe, ditch, tunnel, well, or a floating vessel that carries effluent to a navigable waterbody. The CWA requires point source discharges from mining operations to be authorized under an NPDES permit. Discharges from tailings piles and mining and mineral processing operations are regulated under Section 402 of the CWA, as well as Section 404.

In an attempt to expand the definition of point source, the EPA and private parties have been engaged in several lawsuits, the most recent in December of 2010, In Greater Yellowstone Coalition v. Lewis, where the Ninth Circuit held that “mining pits containing waste rock with engineered covers” do not fall under the point source definition of the CWA, and that “some type of collection or channeling is required” to be defined as a point source.”

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231 CWA §402.
232 CWA §502(14)
233 CWA §502(7)
234 Tailings piles and mining and mineral processing operations are considered ‘point sources’ under §502 of the CWA.
235 628 F.3d 1143 (9th Cir. Dec. 23, 2010).
236 See id., citing Trustees for Alaska v. EPA, 749 F.2d 549, 558 (9th Cir. 1984).
The NPDES permit is considered both a State and a federal permit. Federal agencies cannot grant an NPDES permit until the State where the discharge will take place has granted or waived a permit.\textsuperscript{237} States may implement their own NPDES permitting plan with EPA approval, but the EPA can perform inspections and enforce compliance in addition to the State.\textsuperscript{238} The EPA, after consulting with the Corps of Engineers, can override a State’s authority and refuse a permit after the notice and comment period if it is determined that the discharge would pose a threat to fisheries, shellfish beds, city water supplies, wildlife, ore recreational uses.\textsuperscript{239}

A critical step toward protecting water quality from mining pollutants exists in United States regulatory framework, but is absent in Vietnam: in the United States, individual states issue mining permits per se, but the Office of Water of the EPA may review state-issued permits to ensure compliance with water quality criteria, and ensure effluent guidelines for ore/coal mining and processing are properly applied to wastewater discharges.\textsuperscript{240}

\textbf{D. NPDES Enforcement}

Many mining operations in the U.S. have violated the NPDES discharge requirements. There are several ways to enforce compliance. One can seek temporary or permanent injunctive relief or initiate a civil action against a Section 402 discharge violation.\textsuperscript{241} The CWA may issue administrative compliance orders, forcing a mining

\begin{footnotesize}
\textsuperscript{237} CWA §401.
\textsuperscript{238} CWA §402(c)
\textsuperscript{239} See id.
\textsuperscript{240} NPDES: Mining Overview, US ENVIRONMENTAL PROTECTION AGENCY, Lat updated July 21, 2010, \url{http://cfpub.epa.gov/npdes/indpermitting/mining.cfm}
\textsuperscript{241} CWA §309(b)
\end{footnotesize}
operation, for example, to comply with a NPDES effluent limit.\textsuperscript{242} Criminal penalties of up to $25,000 per day and two years of imprisonment for negligent violations may be imposed, and up to $50,000 a day and 3 years of imprisonment for knowing violations may be imposed.\textsuperscript{243} The EPA may also enforce a restraining order against an operation that presents substantial and imminent harm to health or economic livelihood.\textsuperscript{244}

Even though there are several mechanisms to enforce compliance with discharge limits, there are still many cases in the U.S. where mining companies do not comply. This is due, in part, to a lack of funding for monitoring sites, which could be caused by the lack of political will or the scale-down of federal funding to state programs. Moreover, the EPA has been found on numerous occasions around the country to look the other way when a mine pollutes, and to not enforce its own agenda. One need not speculate on the reasons why, but it is clear that changes within the program in terms of monitoring and tightening of enforcement application need to occur in order for mines to apply appropriate technology and methods to maintain water quality targets.

E. Toxic Chemicals

Over time, the NPDES permitting system has expanded from regulating a small number of conventional pollutants to more complex analyses involving many sources and types of pollution, including toxic chemicals. There are 126 listed toxic pollutants that can seriously degrade water quality\textsuperscript{245} listed in what is called the “EPA Gold Book,”\textsuperscript{246} or

\begin{itemize}
\item \textsuperscript{242} CWA §309(a)(2)(A)
\item \textsuperscript{243} CWA §309(c)(1)(B)
\item \textsuperscript{244} CWA §504
\item \textsuperscript{245} CWA §307(a)
\item \textsuperscript{246} EPA Gold Book, US ENVIRONMENTAL PROTECTION AGENCY, p.91
\item http://www.epa.gov/npdes/pubs/chapt_06.pdf
\end{itemize}
toxics that are regulated by the EPA. If toxic compounds are found in a waterbody, states must implement numeric criteria that are specific to the waterbody and its designated uses. Where mining sites are concerned, States may use the EPA Gold Book criteria or develop their own criteria to address toxic pollutants.247

F. Dredge and Fill §404 Permits

Mines also pollute navigable waters by “discharging dredge and fill” operations, (“land clearing, ditching, channelization, and in-stream mining”248) which are regulated through permitting by the Army Corps of Engineers (hereinafter “Corps”) with EPA oversight and United States Fish and Wildlife Service (USFWS) evaluations and input. The CWA makes it unlawful to discharge dredged or fill materials into “navigable waters” without a permit.249 The term discharge in this context has been interpreted to include additions and re-deposits.250 The Army Corps of Engineers must authorize anyone wishing to discharge dredge and fill material into waters of the United States.251 No permit to discharge dredged and fill material is allowed if a “practicable upland alternative exists that is less damaging to the aquatic environment, or the nation’s waters, including wetlands, would be significantly degraded.”252

Mining operations in the United States were recently afforded much more leeway to pollute. In 2006 the US Supreme Court expanded the definition of “fill material” to include gold mining “slurry” (toxic byproducts of the gold mining process including

247 See id.
248 CWA Section 404 Permits, US ENVIRONMENTAL PROTECTION AGENCY, http://water.epa.gov/type/ceeb/habitats/cwa404.cfm
249 CWA §404
250 33 CFR §232.2 and 323.2(d)2) National Homebuilders Assn. v. Army Corps of Engineers, 440 F.3d 459 (D.C. Cir. 2006), which invalidated the Tulloch II rule for violating the CWA because the rule used volume to determine “incidental fallback”.
251 Supra note 248.
252 CWA §404(b)(1) and 40 CFR Part 230.10(a) and 230.10(c)
arsenic and cyanide which are commonly called “tailings”), resulting in mines now having the ability to dump tailings sludge into navigable lakes. The case began in 2005, when the Army Corps of Engineers issued a §404 permit to Kensington Gold Mine near Juneau, Alaska to discharge 4.5 million tons of mining slurry into a navigable lake (Lower Slate Lake) that runs off into Slate Creek and then to Berners Bay, located 25 miles north of Juneau. The tailings would increase the lake’s size from 23 acres to 60 acres, raise the lake’s bottom 50 feet, and kill all aquatic life within the lake. Moreover, in spring, hooligan fish spawn in Berner’s Bay in the millions, which feed up to 600 bald eagles, nearly 900 Steller’s sea lions, hundreds of harbor seals, and bears.

Several environmental groups challenged the plan, and the question presented was: Is the discharge from Coeur Alaska’s gold mine “fill material” under CWA Section 404 which is regulated by the Corps, or is it a pollutant-effluent discharge under Section 402 regulated by the EPA? The Court held that the Corps could grant a permit to dump slurry into a lake despite the EPA’s jurisdiction over pollutants because the definition of “fill material” is ambiguous in both the CWA and Code of Federal Regulations. The Court explained that the Section 306 limitation of effluents is ambiguous in that it forbids discharges that violate new source performance standards and halts Section 404 permits issued by the Corps. The Court deferred to an internal EPA memo of 2004, which said performance standards did not apply to an initial slurry discharge into a lake, in effect

255 See id.
ruling that a mining company can pollute a waterbody that would have been regulated under the CWA’s effluent provisions.

As one can imagine, the Coeur Alaska case will have far reaching effects on mining pollution into navigable waterbodies, which affect downstream users and biodiversity.

III. OTHER REGULATORY MECHANISMS RELATED TO MINING AND WATER QUALITY

A. The National Environmental Policy Act

Vietnam’s Law on Environmental Protection is similar to the United States’ National Environmental Policy Act (NEPA) that was passed in 1970 in response to wide criticism of administration fragmentation and overlapping agency tasks in regulating environmental and natural resource concerns. The main Congressional goals were to protect earth, land, water and air, by establishing a Council on Environmental Quality, explicitly declare a national environmental policy, and to direct all agencies of the federal government to carry out certain functions such as Environmental Impact Statements—the “action-forcing mechanism.” Its corresponding agency, the Environmental Protection Agency (EPA) was established on December 2, 1970.

NEPA is a tool used for natural resource management that requires the EPA to review and comment on Environmental Impact Statements (EIS) that are prepared for

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258 National Environmental Policy Act of 1969, 42 U.S.C. §§4321 et seq., Title II.
259 See id. Section 101.
260 See id. Sections 102-105.
proposed major federal agency actions that may significantly alter the quality of the human environment and economic viability.\textsuperscript{262} For example, when a new mining project requires federal permits, an EIS is required.\textsuperscript{263} Some activities that relate to mining and require EIS’s are: hard rock mining on federal lands or tribal lands; NPDES permits; and CWA Section 404 permits.\textsuperscript{264} An EIS provides knowledge of the environment that helps the EPA, or corresponding permitting agency, better understand the potential aggregate impacts of mining activity in the surrounding area. An EIS also identifies conditions that require a permit, or that might be subject to rehabilitation.\textsuperscript{265}

While the EIS system is a valuable tool in preventing harm to the environment before a project commences, it is not without problems. The most criticized element of the EIS process is that predictive tools for water quality effects from mining operations are not based on thorough scientific research, information exchanges, and technology development.\textsuperscript{266} Peer reviewed scientific research released in 2006 by the environmental advocacy group “Earthworks” found that none of the mining sites they researched predicted water quality problems in their EIS’s, yet 76 percent of the mining sites went well over the regulated amount of water pollutants.\textsuperscript{267} Moreover, 93 percent of the mining sites with acid drainage did not predict such drainage in their EIS’s.\textsuperscript{268} The series of three studies reported that water quality predictions for mining impacts to clean water in EIS

\textsuperscript{264} See id.
\textsuperscript{265} See id.
\textsuperscript{267} See id.
\textsuperscript{268} See id.
documents were conducted without assessing prior prediction results, and were made
with inadequate information. Mitigation measures to rehabilitate a damaged
waterbody were also based on inaccurate predictions, and the EPA failed to regulate
water quality in some cases.

Researchers also discovered that 76 percent of mines studied exceeded water
quality standards, despite assurances to the contrary; 85 percent of mines exceed water
quality standards that are located near a surface waterbody and are poised for acid
drainage or containment leakage; 63 percent of mines exceeded water quality standards
for toxic heavy metals; and mitigation measures to clean water failed at 64 percent of
mines studied. In all, the study found that the United States, despite numerous mining
pollution control and water quality mechanisms, widely fails to prevent mines from
polluting water.

B. The Comprehensive Environmental Response, Compensation, and Liability
Act

The EPA Superfund program (hereinafter, “Superfund” or “CERCLA”) was
enacted on December 11, 1980, and is a mechanism used to mitigate and rehabilitate
releases, or threatened releases, of hazardous substances that pose a significant threat to
the environment or human health, and is used mainly on mining sites. A Superfund
site is an “uncontrolled or abandoned place where hazardous waste is located, possibly

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269 See id. (“Scientifically based predictive tools used in evaluating the environmental impacts of mining
sites” was the first recommendation made by the EPA in its Hardrock Mining Framework Report, p.8.)
270 See id.
271 See id.
272 New Scientific Research Reveals Widespread Failure to Keep Mines From Polluting Water,
273 CERCLA: 42 U.S.C.A. §§ 9601-9675
274 CERCLA Overview, US ENVIRONMENTAL PROTECTION AGENCY,
http://www.epa.gov/superfund/policy/cercla.htm
affecting local ecosystems or people.” To fund the cleanup process, the law created a tax on the petroleum and chemical industries, and in the first five years over $1.6 billion was collected and deposited into the Superfund trust.

In 1986 the law was amended and reauthorized in the Superfund Amendments and Reauthorization Act (SARA), to increase the trust fund to $8.5 billion, and to provide new technologies and studies to further improve reclamation sites. In general, the Superfund program is considered to be an effective tool in mining cleanup initiatives where other programs have failed; however, only “significant” mining accidents on the National Priorities List are treated under the trust fund due to its relatively small budget, considering cleanup amounts to millions of dollars for a single mine. Since CERCLA’s inception, Superfund has located and reviewed “tens of thousands” of hazardous waste sites, where only a fraction have been attended to.

The Superfund process begins, for example, when a mining spill occurs at significant sites, and other regulatory tools have not achieved rehabilitation goals. The President is authorized to apply any necessary response measure to remove or mitigate the toxic substance, and may ask the Attorney General to commence a civil action to compel compliance by the responsible private parties. The EPA will conduct assessments and inspections, including field samples, in order to gain information on the

276 Supra note 274.
277 Superfund Amendments and Reauthorization Act, 42 U.S.C. §9601 et seq.
278 Supra note 275.
279 The National Priorities list is a published list of hazardous waste sites in the US that are eligible for long-term cleanup funding under the Superfund program. Superfund Basics, US ENVIRONMENTAL PROTECTION AGENCY, http://www.epa.gov/region8/superfund/sfbasics.html.
280 Supra note 275.
281 CERCLA §104(a)(1)
282 Id., §104(e)(5)(B)
seriousness of the spill, and will score the site according to the danger it poses under the
Hazard Ranking System.\textsuperscript{283} The maximum civil penalty for noncompliance on the part of possible responsible parties of governmental inspection, samples, or access to information is $25,000 a day.\textsuperscript{284} The possible responsible party is required to prove with a preponderance of the evidence that the release of hazardous materials was caused only by an act of God, an act of war, or an act or omission by a third party,\textsuperscript{285} or pay for remediation of the site. If the responsible party goes bankrupt, or otherwise does not clean up the site, the Superfund is triggered.

C. The Endangered Species Act

The Endangered Species Act (hereinafter “ESA”)\textsuperscript{286} protects both endangered species and their habitats, including waterbodies that might be affected by mining discharges, through a conservation program.

The ESA is relevant to mining if a threatened or endangered species is found within the land or water confines of a mining project. Section 7 of the ESA protects the survival of an entire species by requiring agencies to proactively work to conserve the species\textsuperscript{287} and requires all federal agencies to consult with the Service\textsuperscript{288} to ensure the proposed activity is “not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of

\begin{itemize}
\item \textsuperscript{284} CERCLA §104(e)(5)(B)
\item \textsuperscript{285} Id., §107(b)(1-3)
\item \textsuperscript{286} Endangered Species Act, 16 U.S.C. §§1531-1544
\item \textsuperscript{287} ESA, §7(a)(1)
\item \textsuperscript{288} The “Service” can mean the Secretary of the Interior through the USFWS, who consults for terrestrial and avian species, as well as wetland and freshwater species, or the Secretary of the National Marine Fisheries Service (NMFS or NOAA), who is responsible for marine and anadromous fish species.
\end{itemize}
designated critical habitat of such species,” and prohibits federal agencies from either jeopardizing listed species or degrading their habitat. For example, if a mine seeks a federal permit, such as an NPDES permit, to build a site on land designated as critical habitat for a threatened or endangered species, the ESA requires an assessment to determine if the proposed mine would jeopardize the species. States can have their own protection program, but the program must be in accordance with federal law, or be more effective than the federal mechanism.

In 2001, the EPA, Fish and Wildlife Service, and National Marine Fisheries Service published a Memorandum of Agreement (MOA) in the Federal Register that put forth procedures to better coordinate the protection of endangered and threatened species under the ESA, the CWA’s water quality standards, and NPDES programs (§402). The MOA established local/regional review teams to set priorities and ensure coordination between activities that involve water quality and endangered species protection. The MOA also created a consultant arm for water quality criteria to protect aquatic life under § 304(a), and a research and data plan for the effects of water pollution on ESA listed species. The MOA also provides guidance to field offices on how to assess ESA consultations and water quality standards, and procedures for the Services to implement the NPDES permits that will protect endangered species. These priorities have probably had a positive effect on water quality with regard to mining discharges.

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289 ESA, §7(a)(2)
290 See id.
292 See id.
293 See id.
294 See id.
prompting mining companies to adopt even stricter controls in discharge limits into waterbodies that are home to threatened or endangered species, or forcing the mining company to abort the project altogether.

D. The Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA)\textsuperscript{295} is an authorization statute that delegates authority to the EPA to control hazardous waste on surface water, land, sediments, and groundwater. The EPA establishes requirements for managing hazardous wastes throughout a project’s, such as a mine, lifecycle, or from first use to disposal.\textsuperscript{296} The EPA has the authority to regulate solid wastes generated from mining activities under RCRA, predominantly focusing on hardrock mining.\textsuperscript{297}

In 1980, Congress passed the Bevill amendment,\textsuperscript{298} which ruled that most mining wastes, including smelting operations, are not a considered hazardous waste under Subtitle C of RCRA because the “material and operation that generates it are not uniquely associated with mineral production.”\textsuperscript{299} Thus, solid waste from extraction, beneficiation and processing of ores and minerals were excluded from regulatory oversight.\textsuperscript{300} In response to the Bevill Amendment, the EPA began a mine waste management program

\textsuperscript{296}Supra note 262 at 1-5. Hazardous waste includes those substances that comprise EPA-defined “characteristics,” such as toxicity, corrosivity, reactivity, and ignitability, and those listed under Code of Federal Regulations §261 Subpart D.
\textsuperscript{297}Supra note 169.
\textsuperscript{298}RCRA 42 U.S.C. §3001(b)(3)(A) and 40 CFR §261.4(b)(7)
\textsuperscript{299}Supra note 263 at 5-6.
\textsuperscript{300}See id. All three were undefined in the RCRA framework. In 1985 the EPA’s report to Congress on extraction and beneficiation wastes from the mining industry showed that 755 million metric tons out of 2 billion metric tons of mining wastes generated annually could fall under the RCRA toxicity characteristics. (Steven G. Barringer, The RCRA Befill Amendment: A Lasting Relief for Mining Wastes? 17 NAT. RES. & ENV. 156 (Winter, 2003).}
under RCRA Subtitle D, called “Strawman II.”

301 Strawman II proposes to widen RCRA control over mining wastes, and would require states to follow strict solid waste standards and planning to improve water quality performance. 302 Strawman II has not been adopted as a regulation, but some states have taken on the format for their mining regulations.

There have been many calls for reform of the Bevill amendment, including a “special waste management program,” for toxic wastes from hardrock mines. 303 Such a program would improve regulations that would protect waterbodies from now excluded toxics, would be funded by Congress to protect the environment, and would create a consistent framework for states and tribes. 304 Reform is necessary, as the Bevill amendment is in direct contradiction to the purposes of the CWA, which are to maintain the integrity of the nation’s waters, and seems to support the mining industry over that stated purpose.

IV. ENFORCEMENT

Enforcement of the various statutes dealing with environmental and water quality involve a complicated and coordinated process between the EPA and Department of Justice, tribal, state, and local governments. 305 States are usually the dominant enforcing

\[\text{References:}\]

301 See id. at 6.
302 See id.
304 See id.
authority of federal statutes.\textsuperscript{306} Citizens are involved with enforcement process by reporting violations and bringing civil lawsuits against violators.\textsuperscript{307}

Likewise, monitoring, evaluations, and inspections by authorized authorities play a crucial role in making sure mines comply with laws and regulations that apply to water quality and the environment. The EPA reported 22,000 enforcement inspections in 2007\textsuperscript{308} by the states, and 136,000 compliance inspections in 2003.\textsuperscript{309} These inspections are not conclusive, but show a marked decrease over a 4-year period, if we are to assume compliance and enforcement inspections are interrelated. The decrease in inspections could be due, in part, to federal funding to state program decreases during the George W. Bush administration.

Like Vietnam, the US does not put forth adequate resources and commitment to enforce violations of environmental and water quality laws and regulations. The EPA has estimated that nearly 20 percent of mines inspected between 1990-1995 by the EPA and States were subject to enforcement actions, and approximately 20 percent of those actions were under the CWA, Clean Air Act, or RCRA.\textsuperscript{310} however, it has been reported that the EPA does not inspect mines to the degree they are called on within the EPA framework.\textsuperscript{311}

Where the EPA has failed in enforcing water quality measures in the mining sector, it also acknowledges that it can take numerous measures to improve environmental protection. In its “Hardrock Mining Framework” circular, the EPA states

\begin{flushright}
\textsuperscript{306} See id.
\textsuperscript{307} See id.
\textsuperscript{308} See id., p. CRS-21.
\textsuperscript{309} See id., p. CRS-22
\textsuperscript{310} Supra note 263 at 2.
\textsuperscript{311} Liquid Assets 2000: Americans Pay For Dirty Water, US ENVIRONMENTAL PROTECTION AGENCY, \url{http://water.epa.gov/lawsregs/lawsguidance/cwa/economics/liquidassets/dirtywater.cfm}
it should use “targeted enforcement and compliance approaches as a tool to better focus resources on the highest priority mining operations,” and that compliance assistance should be a priority and include traditional enforcement mechanisms, such as fines and injunctive relief. The agency further states that it should promote standards of practice that achieve “risk based, long term, environmental protection goals.” The EPA suggests that regions with high mining activity should be staffed with “Regional Mining Coordinators and cross mining teams” in order to ensure EPA water quality program compliance, enhance technical operations, and serve as a staging area for program improvement. All of these measures require funding from Congress, which has been an area of concern. The Environmental Council of the States found in 2004 a $1 billion gap in amount of funding needed by states to implement federal environmental laws.

As mining in the US continues to develop, and the stressed U.S. economy calls for budgetary cuts, it will remain to be seen whether mining pollution oversight, regulation, and enforcement improve in order to protect water quality.

CONCLUSION

Although the world’s awareness of the problem of mining and other types of industrial pollution has increased, it seems to have had little effect on the process of pollution regulation in many countries, including Vietnam, and in part in the United States. Like most countries that embark on the path of industrialization, Vietnam has

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312 Supra note 263 at 9.
313 See id.
314 See id. at 8.
315 See id. at 10.
looked to economic rewards by opening and expanding its mining sector, while simultaneously weakening its commitment to environmental protection, including water quality.

Vietnam recognized the gravity of its environmental situation early on after the Vietnam War, and set out to create laws and regulations, protection plans, technical requirements, and licensing and permitting systems in an effort to protect the environment as a whole, as well as water quality, and to increase environmental awareness. To some degree this has been effective, particularly in areas of the Mekong region and other watersheds that hold interest with NGO’s and foreign aid. Despite these efforts, Vietnam still faces many challenges in its quest for environmental and water quality health. The United Nations Environmental Development Program (UNEDP) reports that the country’s environmental framework is weak because policy and regulatory initiatives do not meet environmental protection benchmarks. The United Nations Economic and Social Commission (UNESCO) for Asia and the Pacific also reports that jurisdictional overlap between ministries, inconsistencies between central government laws and provincial laws, and a lack of clear rules and regulations that clarify procedural requirements for each law prevent effective environmental protection. The lack of harmonization between laws is exemplified by the absence of connection between the LEP and the 2011 Mining Law of Vietnam.

Environmental legislative and policy success in Vietnam will hinge on the ability to create capacity, funding for programs, and networking, and the ability to enforce environmental and water quality laws and regulations that are so often hindered by corruption.
The United States’ system of water quality regulation is much more complex than in Vietnam, but is not as effective as was anticipated when instituted. Various EPA regulatory mechanisms are in place to protect water quality from mining pollution and other discharges, including water quality standards, point source permits (NPDES), environmental impact statements (NEPA), and superfund enforcement and rehabilitation (CERCLA). The Endangered Species Act (ESA) serves to protect endangered species by protecting water quality and other ecosystems. These mechanisms have quelled the destruction of our country’s waters from mining pollutants by imposing preparatory, scientific, and technical limits on discharges into waterbodies. Although regulations and targets are in place, there is still substantial noncompliance in the mining industry, and lax enforcement on the part of state and federal EPA administrative offices.

Part of the problem lies in the fact that the US Mining Law has not been revised since its inception in 1872, which has caused environmental degradation due to antiquated patenting rules and practically free mineral rights on federal lands, which has resulted in tens of thousands of new mining claims a year. Further, there are no provisions within the Mining Law that address environmental protection or water pollution. Like Vietnam’s policy and practice dichotomy, the government’s mining policy in the United States does not adequately support and integrate purpose of the CWA, which is to “restore and maintain chemical, biological, and physical integrity of the nation’s waters.” In short, mining policy sits squarely at the head of the policy table in the United States, much like it does in Vietnam. These issues independently and in the aggregate have created a process that allows, rather than denies, the discharge of too many pollutants into the waterways of the United States.
Both countries should prioritize plans to better reflect the importance of clean water for human health and biodiversity protection. Moreover, they should create a sound compliance and enforcement mechanisms that involve increased monitoring and oversight to mines during operative and closure phases; in the United States, this will undoubtedly require more federal funding directed to state programs. Most importantly, there should be an open and ongoing participatory process at every phase of a mining project from residents that are affected by proposed and existing mines, which allows them to both shape, and protest against, governmental policy and regulations. The public has the right in the United States to be an active force in government, and this transparency and interactive model should apply to issues such as a clean and functioning natural environment and fresh water, or issues that affect the health, wellbeing, and surroundings where they live and visit.