



ZERO-BASED ENVIRONOMICS

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1.0 INTRODUCTION

In the United States today, the permitting and operation of many industries, particularly mining, are no longer driven by the actual economic or social benefits to mankind, but by the perceived or potential impacts and risks to the environment and its ecosystems. A term which describes the ecological equilibrium that results from the environmental consequences of our economic decisions is Environomics. In a quest to reverse this historical imbalance between the progress of mankind and the protection of nature, concerned groups and individuals have convinced politicians that regardless of cost, the federal government can meet zero health risks and nondegradation of the environment through greater control and creation of more regulations and agencies. Historically, industry as a whole has not provided the vision, the leadership, or responsiveness necessary to satisfy these concerns.

Nonetheless, the results of the quest to reverse this environomic imbalance have been impressive with respect to our cleanup of historical environmental problems and application of our increased environmental awareness in establishing future safeguards. Industry has responded well by contributing significantly to our basic scientific knowledge and by funding most of the innovative technological developments. Unfortunately, industry and manufacturing are rapidly relocating outside the United States, partially in response to the unpredictable and increasingly stringent regulatory climate. The proven treatment technologies developed specifically to protect the environment, are not following industry's exodus as quickly, leading to a form of global environmental hypocrisy.

A review of the current environomic situation indicates that the ecological equilibrium has now

shifted far from its historical perspective, driven by a perception that we must live in world of zero ecological and human health risks. As the analytical measurement of zero is driven further to the right of the decimal point, our ability to apply this quantity in a meaningful manner becomes more debatable, as our ability to conceptualize it becomes more intangible. No industry more dramatically illustrates the conflicting environomic agenda than the mining of minerals and primary metals. In this paper, the past, present, and future of environomics and the mining industry are explored with emphasis on the interrelationships among the growth of regulations, the role of government, the degree of acceptable health risks, the costs to society, and the impacts on global environmental protection.

2.0 THE ORIGINS OF ZERO-BASED ENVIRONOMICS

In the 1970's, awareness of the natural environment and the impact humans have upon it became a national focus following establishment of Earth Day, and enactment of the first Clean Water and Water Pollution Control Acts. For the first time following the post-war industrial and manufacturing expansion, economics was not the only consideration in creating a quality of life known as the "American Dream".

In order to implement the new environmental mandate, the federal government created the Environmental Protection Agency (EPA). For the most part, individual States were only in the initial phases of establishing environmental programs and agencies for protection of the air and water, disposal of solid wastes, and protection of humans and wildlife. Studies were undertaken to quantify the extent of environmental impact and contamination, and to develop appropriate technologies for the removal of toxicants from the air and water. During this period, the EPA was charged with creating the framework for environmental protection and serving as a research and development organization. The primary goal was to provide a vision and a template for the States, using a combination of science and engineering to solve long term environmental problems.

The construction of new industrial complexes or manufacturing plants required extensive permitting and an Environmental Impact Statement (EIS). The permitting of these facilities spawned a new industry termed environmental consulting. In conjunction with permitting came the federal mandate to clean up the surface waters within the United States through design and construction of hundreds of new publically owned treatment works (POTW's). Consulting firms flourished and grew into large employers of college educated "white collar workers". Individual activists and concerned citizens united and formed the first national and international environmental groups.

Of course all of this awareness and activity did not go unnoticed by the lawyers and our leaders, who saw the growing environmental movement as a political opportunity. Once the politicians became "concerned" with environmental matters, there was no turning back. The quantifying of the environmental consequences of economic decisions became the overriding social factor in determining the need for and limits to growth. Small had become beautiful. No one foresaw the economic consequences of the ultimate environmental decision, which was to not only protect ourselves and the environment, but to eliminate risk completely.

The interrelationship of these economic and environmental concepts is known as "Environomics".

The mandate to completely eliminate toxics, point source and non-point source discharges, and environmental risk, coupled with the ability to analyze lower and lower levels of potential contaminants, has brought Environomics to a level at which the search for zero or nothing has become the ultimate social goal. The elimination of risk and the quest for zero form the basis of Zero-Based Environomics.

The attempt to completely eliminate risk is contradictory to the inherent risk found in nature and the risks individuals have taken historically in the development of countries and societies. The essence of the "American Spirit" and its strength as a nation are best exemplified by great personal sacrifice and the risks taken in establishing freedom and the building of the country. With a background on the perspective of Zero-Based Environomics, the next section examines its interrelationship with other important concepts of society and environmental regulation.

3.0 THE COST OF CITIZEN CONCERN

The prioritization of needs and concerns within a society, and the manner in which these needs and concerns are funded should be mandated by the public at large. The implementation of public policy is the task of local, state, and federal government. The government is the servant of and should be held accountable to the public. Unfortunately, specialized interest groups, representing a minority of individuals and their personal agendas, have become the predominant force directing government and elected officials. The lack of accountability is a serious issue, since elected officials, with unlimited term restrictions, are responding to the desires of the interest or political action groups, which contribute heavily to campaign funding.

The basic concerns of society include national defense, education, crime, health, entitlements, and the environment. The cost of adequately addressing these concerns is staggering and growing rapidly. At some point, the ability to increase revenue ceases as the middle class grows smaller, government payroll increases, the deficit soars, society lives longer, and as the rate of taxation reaches intolerable levels. As the available revenue reaches equilibrium, decisions must be made regarding which of society's concerns must be addressed and to what extent. In the United States, the difficult decisions are not being made due to lack of accountability and the influence of personal agendas. Taking the view that there is a limit to generating federal revenue, there is a need to prioritize the concerns and needs of society to achieve the greatest good for the most people. In addition, it is the responsibility of the people to educate themselves in greater detail with respect to the important social issues.

While the apathy and synecism of the individual growth, the influence of the environmental lobby on the political process has increased considerably. Data from the Federal Election Commission reveals that Republican and Democratic organizations received a total of 89.7 million dollars from a donor base of 2,370,300 in 1989. According to Congressman William Dannemeyer (R-CA), the twelve major environmental organizations within the United States had a combined operating budget of 336.3 million dollars in 1988 with a donor base of 12,959,000.

These values were nearly 250 million more dollars and 10 million more people than the combined

donation base of the two major political parties (Dannemeyer, 1990). Today, there are hundreds of national environmental groups, and thousands of state and local groups, contributing donations and support for political agendas and candidates.

In another article written in 1992, the budget of the "Beltway Environmental Lobby" consisting of about 20 major groups, was estimated at about 600 million dollars with a donator membership of 15 million (Brimelow and Spenser, 1992). The main approach of this lobby with respect to the EPA is litigation, which accounts for the manner in which four out of five major decisions are made by the agency.

As the influence of special interest groups continues, Americans are paying for ever greater levels of environmental protection. In a speech given by Dixie Lee Ray to the Pacific Research Institute, she stated that the cost of implementing federal regulations ranged from about \$8,000-17,000 year, while the average income tax payment to the federal government per family per year was \$11,000. Other estimates range from \$1,700 per taxpayer per year to \$2,000 annually per household. In the 1993 federal budget, the total cost of administering federal rules and regulations covering health and safety was 560 billion dollars, while the budget for the Department of Defence was 216 billion dollars (Ray, 1992).

The EPA has estimated that about 1.4 trillion dollars has been spent on compliance since its founding in 1970. The expenditure of 1.4 trillion dollars has resulted in a 90 percent reduction of industrial pollutants from the air, water, and land. In 1990, the EPA estimated that pollution control regulations were costing Americans a total of 115 billion dollars per year or about 2.1% of Gross National Product (GNP) (Brimelow and Spenser, 1992). The EPA also estimated that compliance costs will total another 1.6 trillion dollars in the 1990's, not including the 1990 Clean Air Act which will cost an additional 25-40 billion dollars annually. The additional expenditure of 1.6 trillion dollars would result in an estimated 5 percent further reduction in pollution. A review of the prioritization process of how and where tax revenue will be allocated appears reasonable.

At the state and local level, the cost of environmental compliance to still citizen concern has reached intolerable levels. Representative Olympia Snow (R-Maine) has completed a study that indicates that implementation of the new Clean Water Act requirements will cost the state 1.5 billion dollars a year. The state's total revenue, which comes mainly from property taxes, is \$750,000 per year (Ray, 1992).

Tom Fink, the mayor of Anchorage, Alaska, prepared a document for the United States Congress dealing with the impact of environmental compliance on cities (Fink, 1992). In the The 1992 Budget of the United States it was reported that 1,200 new environmental regulations were added in 1990 alone. In Columbus, Ohio, the city commissioned a study which found that nearly 20 percent or 100 million dollars of its budget would be spent on environmental compliance by the year 1995 (Reed, 1994).

The mayor of Columbus questioned whether spending millions of dollars on further water treatment would improve the public health better than spending far less on the increased immunization of children.

In this case the city was being told to construct additional water treatment at a cost of 16 million dollars and an annual operating cost of 2.4 million dollars to lower atrazine, a pesticide, to three parts

per billion.

With respect to jobs, CONSAD Research Corporation, a consulting group, projects that at least 200,000 jobs will be lost due to the Clean Air Act amendments of 1990. The United States Senate has estimated that collectively about 3.4 million jobs will be lost due to the Clean Air Act. The loss of forestry jobs related to the protection of the Northern Spotted Owl has been estimated at 30,000 and could reach 100,000. The loss of jobs takes on higher importance, since there are now more people working for government than in basic manufacturing (Barlett and Steele, 1992). Since the 1950's the number of manufacturing workers has fallen from 33 percent to 17 percent, and decreasing. In conjunction with falling payrolls is the lowering of the wages made by the remaining workers.

Part of decline is due to the inflexibility of and the unrealistic goals that environmental regulations have placed on industry. The end result of this decline, is that the rising cost of environmental regulations is being funded by an ever decreasing pool of workers earning lower wages on average. The number of workers found in retail and service are growing rapidly, where the salaries are low and the benefits are minimal. At the same time, the wages of government workers are growing, as is their benefit and retirement packages. As a result, the individual's share of the total federal income tax collected has risen from 61 to 83 percent, while corporate America's share has decreased from 39 to 17 percent (Barlett and Steele, 1992). Nearly one fifth of the year-around full time workers now earn a wage below the poverty level. The percentage of men earning low pay has nearly doubled from 7.7 percent in 1979 to over 14 percent in 1992.

The point of this discussion is that the available revenue to address the societal concerns of citizens is reaching a plateau, and that a considerable and ever-increasing proportion of the available revenue is being shifted toward environmental control, in an attempt to completely eliminate risk and contamination. The the search for zero is becoming the major social crusade of the 1990's. The obsession for the right side of the decimal point has left the rest of world largely non-attainable. In the next section, a discussion of the current status of environmental cleanup is provided, along with a more indepth review of the role and goals of the USEPA as an agency.

4.0 EMOTION VERSUS EDUCATION

The status of the EPA and the environmental in general is worthy of examination. The EPA now has an annual budget of 4.5 billion dollars and a staff of 18,000, about one third of which reside in Washington, D.C. The total number equates to about 360 individuals for each state in the country. In conjunction with the enormous growth of the agency, has been the establishment of individual regional, state, country, and municipal environmental agenices covering air, water, human health, worker safety, and solid and hazardous wastes. The initial goal of the agency and the federal mandate was to implement the first Water Pollution Control Act and Clean Water Act.

The goals of these laws were to develop area wide water or basin management plans, beneficial use classifications, and water qauality standards. The ultimate environmental goal was to control point source discharges of domestic sewage and industrial wastewater in a manner to achieve 85 percent

fishable and swimmable waters.

About 95 percent of nations original air, water, and soil pollution has been cleaned up since the inception of the EPA (Fink, 1992). The concern at the state and local level of government relates to the value of cleaning up the remaining 5 percent based upon federal mandates, when there is a limited operating budget and there are other more important social problems and public concerns. Other estimates of total environmental restoration are placed at about 90 percent (Ray, 1993). Ms. Ray indicated that about 95 percent of the carbon monoxide, 80 percent of lead, and 76 percent of the nitrogen oxides have been removed from the air. If carbon monoxide is produced through the burning of gasoline and preference of one person per car is continuing, the benefit and social risk of chasing the remaining 5 percent of non-point sources of air pollution in non-attainment areas must be questioned.

According to information compiled in the 1993 Information Please Environmental Almanac, a survey of each state has indicated that about 80 percent of all rivers and streams were meeting their standards, while about 75 percent were considered suitable for swimming. The pollution remaining is largely due to uncontrolled and diffuse agricultural non-point sources. The improvement in the quality of our environment is even more dramatic when one considers the increased population and efficiency seen in energy consumption, for example automobile gas mileage.

In light of the enormous strides that have been made in America in cleaning up the environment and the establishment of well organized and staffed state and municipal environmental agencies, the future direction of the EPA should be examined. Clearly, establishment of the EPA as a full governmental Department appears somewhat like closing the barn door after all the horses have got out. The EPA at present has been transformed from a vibrant research, problem solving entity to another ho-hum federal bureaucracy, looking for direction and some way to stay in "business". One way to stay in business is to increase its power and to create additional mandates and regulations.

As America approaches the year 2,000 and begins building the information highway, it is interesting to examine the manner in which people receive their environmental information. A wealth of information is available in the Trendlines section of the 1993-1994 Environmental Management Sourcebook. As a business, the environmental industry has grown from about 36 billion dollars in 1980 to over 150 billion dollars today. The total expenditure for remediation of DOE, DOD, Superfund, State programs, and industrial UST's was about 6.5 billion dollars in 1992. On a global basis, the United States accounts for about 50% of the estimated \$270 billion dollar environmental industry.

From the public perspective Trendlines noted that 52% and 29% of the people considered themselves sympathetic to environmental concerns and active environmentalists. In addition, 63% of the people surveyed indicated that environmental regulations do not go far enough with respect to protection.

The primary of environmental information used by 81% of the people surveyed was the media. With respect to information used by newspaper and TV reporters in preparing stories, 65% of newspaper reporters and 50% of TV reporters used either environmental activist groups or the government as their primary sources.

Industry or business was used only 2% of the time as a primary source for a story on environmental issues. However, when reporters themselves were surveyed, 72% of them indicated that reporters in general lacked the training and educational background to cover stories on the environment. 69% of the reporters surveyed indicated that it was hard to find unbiased sources, while 70% said their management were respective allowing adequate environmental reporting. 36% of the reporters indicated that they felt their profession was biased against business.

7.0 THE MINE SET OF THE MINE SETTING

Using the historical perspective on the development of the environmental movement and the current regulatory framework, the focus turns to the resultant combined impacts on a particular industry, which in this case is mining.

There are four basic production industries in the United States, including energy (i.e. oil and gas), timber and forest products (i.e. including pulp and paper), mining, and agriculture (i.e. including farming and ranching). From these four basic production industries comes the other primary manufacturing and secondary service and communication industries.

Systematically, each of the four primary production industries have come under severe criticism and regulatory control by government at all levels. The first of these industries was oil and gas, which relocated primarily to the Middle Eastern countries. The second industry was timber and forest products, which has been relocating to Far East and other countries. The third industry is mining, which is rapidly relocating to Central and South America. The fourth industry is agriculture which is being blamed for large environment impacts to wetlands and as the primary source of non-point source pollution. The end result of more criticism and control, beyond that which is considered reasonable, is the relocation of these primary production industries outside of the United States, taking with them national security and higher paying industrial jobs. The secondary manufacturing industries and jobs are also leaving the country.

The interesting aspect of this mechanical migration (i.e. the opposite of the industrial revolution) is that in most instances the environmental problems associated with a particular industry have been identified and pollution control technologies have been developed.

For example, in the mining industry the primary issues include geotechnical stability, disposal of solid wastes, treatment of cyanide and metals containing solutions, and control of acidic mine drainage or AMD. These issues can be identified, characterized, and controlled properly to avoid adverse environmental impact. In addition, appropriate bonding can be calculated to avoid the "walk away" situation in which individuals pay for cleanup and closure.

In these situations, the cost of cleanup or closure soars rapidly when the government assumes the responsibility versus the private sector. The best example of the worst situation is the abandoned Summitville Mine in Colorado.

It is important to place the importance and impacts of mining in perspective. The mining of minerals and metals provides the raw materials from which most of our products are created. The only other sources of construction and manufacturing materials include timber and plastics.

The number of miles of rivers affected by mining activities in the United States has been estimated at 12,000 (Kleinman, 1991). Of that total about 1/3 is due to acidic mine drainage or AMD. Based upon about 20 years worth of data, the impact of AMD has decreased by about 1/3. In addition, about 50% of the rivers affected by AMD 20 years ago were in Pennsylvania alone. On a percentage basis, assuming the total number of miles of rivers considered fishable was reported as about 657,000 by the Information Please Environmental Almanac, the total mine impacted river miles is about 2% with <1.0% affected by AMD. On a national basis over \$1,000,000 a day is spent on treating AMD.

In the case of cyanide, no accidental deaths have been reported in the mining industry in North America during the 20th century (Mudder and Smith, 1994).

Based upon 1993 information obtained from the Mineral Information Institute located in Denver, Colorado, less than 0.2% of the land area of North America is used by the mining industry. In the United States about 6 million acres are used by the mining industry, while there are about 1.2 billion acres of agricultural lands and 263 million acres of wilderness and national park lands. About 47% of the land mined between 1930 and 1980 has been reclaimed.

In terms of governmental agencies involved in one aspect or another with mining, there are the U.S. Bureau of Mines, the USEPA, the BLM, the Forest Service, the Corp of Engineers, the Mine Safety and Health Administration (MSHA), U.S Fish and Wildlife Service, as well as a number of individual State departments and agencies. The regulations include the Clean Water and Air Acts, NEPA, NPDES, RCRA, CERCLA, Corp of Engineers 404 permits (wetlands), the Endangered Species Act, and of course the State standards and permitting requirements.

The perspective of the impact of and controls on hard rock mining indicate that most of the environmental issues are site-specific and limited in nature to small areas. The sources of the impacts have included poor planning, insufficient reclamation bonding, and mismanagement during operation, three aspects that can be now be addressed properly.

The environmental agenda is to eliminate mining on federal lands, where most of the mineral reserves reside. Since the available ore reserves are located in "sensitive areas", the EIS process now involves so many different agencies and has expanded to include so many requirements, that typically between 5-10 years are needed to acquire the necessary permits. The requirements has increased on the basis of assuring zero risk and impact to the environment, an unrealistic and achievable goal. The elimination of mining does not remove risk to the environment from volcanic eruptions like Mt. Saint Helens, forest fires that those which burned 50% of Yellowstone Park, or meteors which have been blamed for the extinction of dinosaurs.

In the meantime, the need for energy, building materials, agricultural products, and metals grows as the population grows, even with advent of recycling and conservation. The search for metals continues outside of the country, taking with it the potential for environmental impact. The end result is a form of "Environmental Hypocrisy". Most of the mining companies entering foreign

countries are applying the same level of environmental protection as would be required in the United States. Many of the foreign countries in which mining is expanding have developed or are developing regulations patterned after the original concept of the USEPA.