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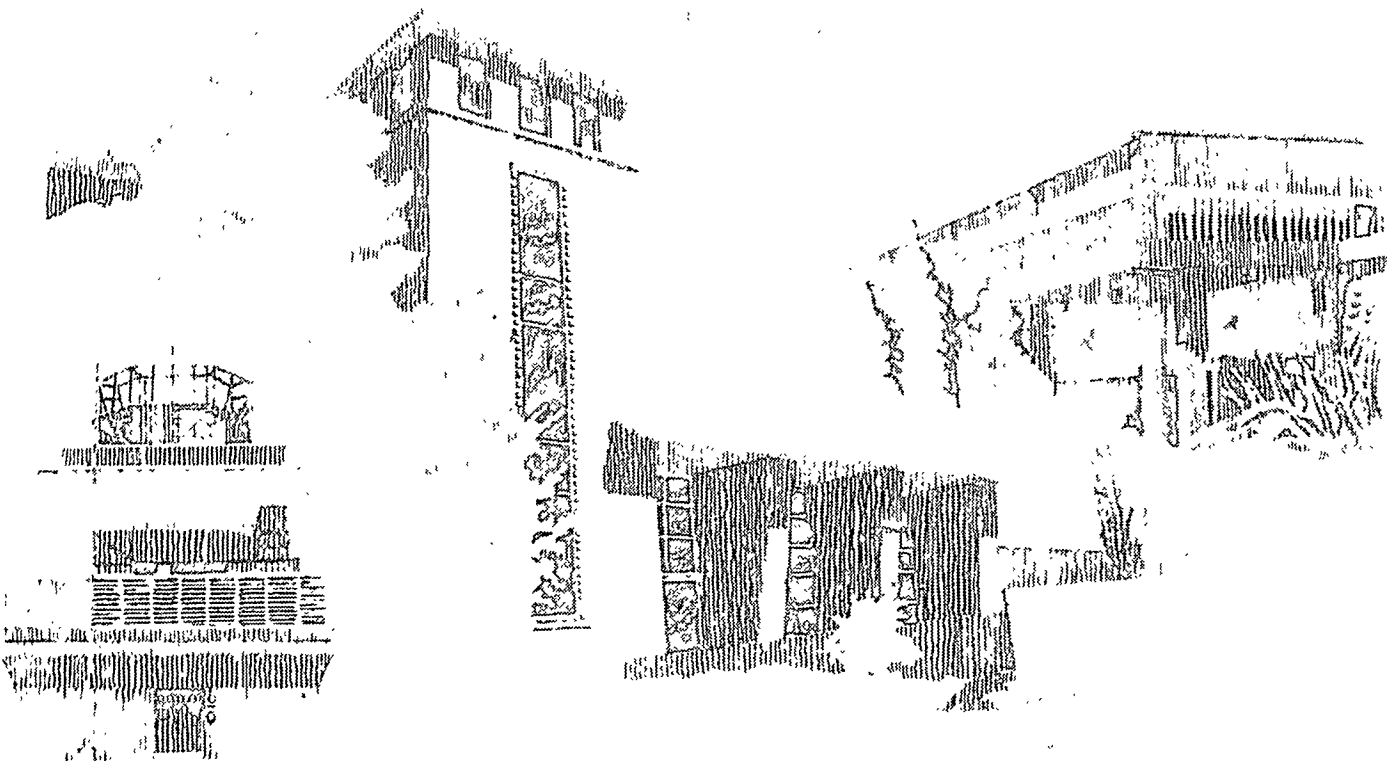
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Environmental Prosperity Game

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Prepared by
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Albuquerque, New Mexico 87185 and Livermore, California 94550
for the United States Department of Energy
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ENVIRONMENTAL PROSPERITY GAME

**March 29-31, 1995
Pacific Gas & Electric Learning Center
San Ramon, California**

**sponsored by the
Silicon Valley Environmental Partnership**

Final Report by

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Kevin W. Boyack
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Albuquerque, New Mexico 87185**

**Produced by the Department of Energy's
Sandia National Laboratories**

in collaboration with Lawrence Livermore National Laboratory

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ABSTRACT

Prosperity Games are an outgrowth and adaptation of move/countermove and seminar War Games. Prosperity Games are simulations that explore complex issues in a variety of areas including economics, politics, sociology, environment, education and research. These issues can be examined from a variety of perspectives ranging from a global, macroeconomic and geopolitical viewpoint down to the details of customer/supplier/market interactions in specific industries. All Prosperity Games are unique in that both the game format and the player contributions vary from game to game.

This report documents the Environmental Prosperity Game conducted under the sponsorship of the Silicon Valley Environmental Partnership. Players were drawn from all stakeholders involved in environmental technologies including small and large companies, government, national laboratories, universities, environmentalists, the legal profession, finance, and the media.

The primary objectives of this game were to:

- Investigate strategies for developing a multi-agency (national/state/regional), one-stop regulatory approval process for certifying and implementing environmental technologies and evaluating the simulated results.
- Identify the regulatory hurdles and requirements, and the best approaches for surmounting them.
- Identify technical problems and potential resources (environmental consultants, labs, universities) for solving them.

The deliberations and recommendations of these players provided valuable insights as to the views of this diverse group of decision makers concerning environmental issues, including the development, licensing, and commercialization of new technologies.

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EXECUTIVE SUMMARY

Environmental issues are of major concern to many stakeholders in the US. Congress is currently debating the impact of federal regulations on the economy. The Rochester Institute of Technology has estimated that environmental regulations cost the nation about \$400-\$500 billion per year (\$4000-\$5000 per household). The US Office of Management and Budget has estimated that paperwork associated with environmental compliance consumes 5 billion hours per year. Almost all stakeholders believe the processes and systems in place can be improved, while simultaneously protecting the environment. New environmental technologies could assist in lowering costs and improving quality. This Environmental Prosperity Game explored the processes involved in developing, financing, permitting, and marketing new technologies for environmental cleanup and pollution prevention.

This is the eighth Prosperity Game that has been conducted. The game was sponsored by the Environmental Partnership of Joint Venture: Silicon Valley in California. The game was designed and produced by Sandia National Laboratories in conjunction with Lawrence Livermore National Laboratory.

All major stakeholders and participants in the environmental technology process were modeled as teams and individuals within the game. Seventy players and 29 staff participated in the game. Most players played roles similar to their real-life roles. The game was designed as a challenge to the technology developers to successfully market their technologies. The specific objectives included:

- Investigate strategies for developing a multi-agency (national/state/regional), one-stop regulatory approval process for certifying and implementing environmental

technologies and evaluating the simulated results.

- Identify the regulatory hurdles and requirements, and the best approaches for surmounting them.
- Identify technical problems and potential resources (environmental consultants, labs, universities) for solving them.

A separate scenario was defined for each of the four entrepreneurial teams: building a new landfill; building a new environmentally conscious facility for manufacturing batteries; reducing emissions from refineries using a new thermal oxidation process; and cleaning up land contaminated by the waste from an engine company by using electron beams.

To accomplish their goals, the companies had to satisfy the requirements imposed on them by federal, state and local regulators, environmentalists, and members of the public affected by their projects. They could get assistance from suppliers, legal consultants, current and future customers, and others. Simultaneously, the state legislature and the US Congress were pursuing their own political agendas.

All teams were given challenges to meet in the course of the game, which simulated a span of five years. Creativity and initiative were encouraged in seeking solutions and collaborative ventures.

This was a highly complex game because of the large number of stakeholders, the prior existence of adversarial positions, and the web of regulations and hurdles that exist in the environmental arena.

The game demonstrated that the current system is badly in need of repair or complete revision. Existing regulatory systems, entities, and processes are much too expensive, time

consuming and cumbersome to serve the ends for which they were created. The condensed time frame of the game made this indelible point: An entirely new paradigm is needed for all the stakeholders in the environmental area. Such a paradigm would require cooperation from all parties.

In previous games, players often developed highly creative solutions to problems and challenges. Such creativity was not implemented in this game, perhaps due to the nature of the environmental systems and processes. Although many players initiated creative concepts to improve the legislative, regulatory and business systems, very few managed to reach fruition over the 5-year time frame. Most players were so engulfed in their daily tasks, that their long-term strategies were neglected or proved difficult to effect. On the final day of play, some teams had accomplished their objectives and had time for reflection and planning, but they did not turn their energies into defining and implementing new paradigms.

The game only began to investigate strategies for developing a multi-agency one-stop regulatory approval process. Although most players favored this concept, there was no clear definition of what it would mean. Issues of "turf protection" may also have negatively impacted its realization, even in the simulation format.

On the other hand, the Legislative team passed two important bills. One created a National Technology Certification Program for all media (air, water, soil, etc.), delegating authority and funding to the US EPA, and specifying a pilot program in conjunction with the state of California. They also passed the "1997 Environmental Reorganization Act" for California that included some very innovative thinking in technology certification, testing,

evaluation, and permitting. The bill is sufficiently well composed that it should be considered by the California legislature.

Many game objectives were met. The regulatory hurdles were realistic and accurately portrayed. Although the labs and universities offered significant technology expertise, they were primarily used in the game as "honest brokers," to validate technologies or to perform tests and certification.

The Finance team viewed most environmental business investments as risky, and made few loans in the game. The Environmentalists compromised in some areas, and held steadfast in others. The Public sought industry funding for pet projects; they wanted cash and equity in exchange for public cooperation. The Regulators wanted to make improvements through legislation.

Most teams tried to develop collaborative approaches and there was strong evidence of teamwork and partnering. However, some litigation occurred (three cases), but this is apparently a much lower frequency than occurs in real environmental disputes.

The goal of long-term thinking and planning was not met. The players were unable to accomplish this in the game context.

The National Environmental Summit Meeting addressed three issues with diverse viewpoints. Although the discussion implied agreement in principle with unified standards, the poll at the end of the game showed a strong divergence of views, both pro and con. A concern raised was that such standards would result in the "lowest common denominator" approach.

Strong disagreements surfaced in the discussion of incentives for regulatory compliance. Incentives were favored by those

who wanted to move from a compliance-based system to performance-based regulations. Advocates of new technologies also valued incentives. Opponents feared “fly-by-night profit mongers,” who would not behave in an environmentally conscious way. These people favored strong laws with high penalties. They also believed that environmental costs needed to be included in the prices of products, rather than being borne by taxpayers.

The final issue addressed protection from unscrupulous companies with unproven technologies. Some believed this to be a major problem. Others questioned the assumption itself; they argued that most environmental technology companies were going broke, rather than making large profits. The idea of a “lemon law” to protect against bad technologies was met with a polarized response. Advocates argued that if we can do it for cars, we can do it for the environment. Opponents argued that such laws are either not necessary, or they would squelch new technologies.

As in all previous games, some teams and players were more successful than others. All four business teams satisfied their requirements at the end of the game. Some very significant environmental legislation was passed. Many players became strongly entrepreneurial, and were financially successful.

Several improvements in the game will result from the players’ comments and evaluations. Success will be made more uncertain by altering the probability distribution to reflect aspects of future events that are not predictable and not directly related to the level of investment. Facilitation skills will be honed to encourage players to apply their expertise to developing new and improved paradigms for change.

Although many suggestions were made to further improve the Prosperity Game concept, the players were generally very positive about the experience. For example:

“It is uncanny how many elements of our ... Environment Prosperity Game scenario [are] being played out in the marketplace.... I really enjoyed... what turned out to be a slice of real life.”

“I think the Environmental Prosperity Games were an overwhelming success.... I think I benefited from the role-playing, networking, and being able to participate in *Impetus Futuro*, Force for the Future. But most of all, having the opportunity to work with you and your excellent staff.”

Prosperity Games are primarily intended to provide a learning experience and to perform experiments to estimate the consequences of high-level decisions on future events. However, follow-on actions are required to implement this learning and research into the lives of the players, and to effect social, technical, and political change. The Prosperity Game designers cannot lead this change movement. The players and sponsors must take actions to implement new solutions and alternatives. We are ready to provide further assistance in this change process.

INTRODUCTION

A Prosperity Game is a new type of forum for exploring complex issues in a variety of areas

**Prosperity Games
explore complex
issues**

including economics, politics, sociology, environment, education, research, etc.

The issues can be examined from a variety of perspectives ranging from a global, macroeconomic and geopolitical viewpoint down to the details of customer/supplier/market interactions in specific industries. The concept originated in meetings with the staff of New Mexico Senator Jeff Bingaman, with Lee Buchanan of the Advanced Research Projects Agency, and with other government and industry people.

Prosperity Games are an outgrowth of move/countermove and seminar war games. They are executive-level interactive simulations that explore complex issues in a variety of economic, political and social arenas. The simulations are high-level exercises of discretion, judgment, planning and negotiating skills, not computer games. They explore the problems and opportunities faced by businesses, government, laboratories, universities and the public.

Seven previous Prosperity Games have explored environmental issues and economic competitiveness in electronics manufacturing. This was the first full game to focus on environmental technologies. Given our shared commitment to both sustainable economic development and protection of the environment, a guiding principle for our economy must include the development and use of new environmental technologies.

Environmental technologies represent a complex and atypical market; entrepreneurs face many technical, financial, regulatory, and business hurdles. The unique value of this

game is that, in a very short period of time and in a simulated setting, one can experience the complex interplay of all the business, regulatory and public forces involved in taking an environmental technology to market.

The game included four entrepreneurial teams ("Blue Teams") attempting to launch their environmental technologies into the 21st century. Three "Green Teams" represented US, state and regional environmental regulators, environmental activists, and members of the public. Other teams represented suppliers, customers, judges, lawyers, legislators, the news media, venture capitalists, and banks.

Objectives

This is the eighth Prosperity Game that has been conducted. The objectives of all these games have been to:

- Stimulate thinking;
- Develop relationships and partnerships among industry, government, labs and universities;
- Explore long-term strategies and policies;
- Lay the foundation for industrial roadmaps; and
- Provide informed input for possible future legislation.

In addition to these generic objectives, the sponsors, in conjunction with Sandia and Lawrence Livermore National Laboratories, developed an additional set of specific and general goals:

Specific:

- Investigate strategies for developing a multi-agency (national/state/regional), one-stop regulatory approval process for certifying and implementing environmental technologies and evaluating the simulated results.

- Identify the regulatory hurdles and requirements, and the best approaches for surmounting them.
- Identify technical problems and potential resources (environmental consultants, labs, universities) for solving them.

General:

- Develop partnerships, teamwork, and a spirit of cooperation among environmental entrepreneurs, regulatory agencies, users of environmental technology, environmentalists, the public, and the media.
- Increase awareness of the needs, desires and motivations of the six different groups.
- Bring conflict into the open and manage it productively.
- Explore long-term strategies and policies.
- Provide input for possible future legislation.
- Provide a learning experience.

Game Theory

In mathematics, game theory is the study of strategic aspects of situations of conflict and cooperation. "Game Theory approaches conflicts by asking a question as old as games themselves: How do people make 'optimal' choices when these are contingent on what other people do?"¹ Game theory originated with the mathematician John von Neumann as early as 1928. The collaboration of von Neumann on theory and Oskar Morgenstern on applications to economic questions led to the seminal book *The Theory of Games and Economic Behavior* that first appeared in 1944, and was later revised in 1947 and 1953. Game theory is an approach to developing the best strategies in areas such as economics and war to beat a competitor or enemy. [Of course, one possible strategy is to convert an enemy into an

ally, or a competitor into a partner!]

A game is defined by a set of rules that specify the players, their desired goals, allowed interactions, and a method of assessing outcomes. There can be one or more goals with different levels of importance. The

Games should involve look-ahead strategies

players adopt strategies, and the interactions of the "moves" based on

those strategies lead to outcomes which may or may not be consistent with the players' goals. Complex games should involve look-ahead strategies that address the different possible moves that an opponent could make. It is important to try to understand an opponent's goals in order to maximize the probability of a favorable outcome. Games can be sequential, with player interaction allowed between moves.

PROSPERITY GAME DESCRIPTION

Teams

The game involves thirteen basic teams:

Four Blue (business) Teams.

Three Green (environmental) Teams: US, state, and regional environmental regulators; the "public" (citizens' advisory groups, interested individuals); and environmentalist groups.

One Purple (customer) Team, representing potential customers for the Blue Teams including businesses, military bases, DOE waste sites, manufacturing industries, municipal sewage and solid waste departments, or any other potential user of the environmental technology/product.

One Yellow (supplier) Team representing private environmental consultants, national laboratories and universities.

¹From Steven J. Brams, "Theory of Moves," *American Scientist*, 81, 562-570, November-December 1993.

Four Red Teams representing: 1) the legal system (judges/lawyers acting as mediators, judges, attorneys, legal consultants, lobbyists, etc.); 2) bankers and venture capitalists to help finance the entrepreneurs and customers; 3) the news media; and 4) elected members of national, state and local governments who can consider legislative solutions to problems that arise during the game.

Players

As much as possible, all players faithfully play their roles including entrepreneurs, regulators, activists, legislators, TV news reporters, venture capitalists, bankers, interested members of the public, etc. A list of players and their team assignments is given in Appendix A. The game schedule is described in Appendix B.

Game Objective

The primary game objective represents attempts by the Blue Teams to develop and sell their products and technologies, or to implement them to deal with pressing environmental problems. To accomplish this, they must have a good product, be able to overcome the regulatory, legal and citizen requirements placed in their path by the Green Teams, gain technical and financial support, and convince a customer of the desirability of their product. The Blue Teams are encouraged to develop partnerships and alliances with labs, universities, consultants, customers, and even each other. The Blue Teams are also encouraged to work for win/win agreements with regulators, environmental activists, state legislators, the public, and the news media.

The game is designed to investigate environmental issues such as: uniform versus multiple permitting; standards for determining how clean is clean enough; regulations originating from a multitude of different

environmental agencies; surface water standards; public acceptance; environmental justice; and philosophies that limit environmental action such as NIMBY (Not in my back yard).

A schematic diagram of all the teams and their connections is shown in Figure 1.

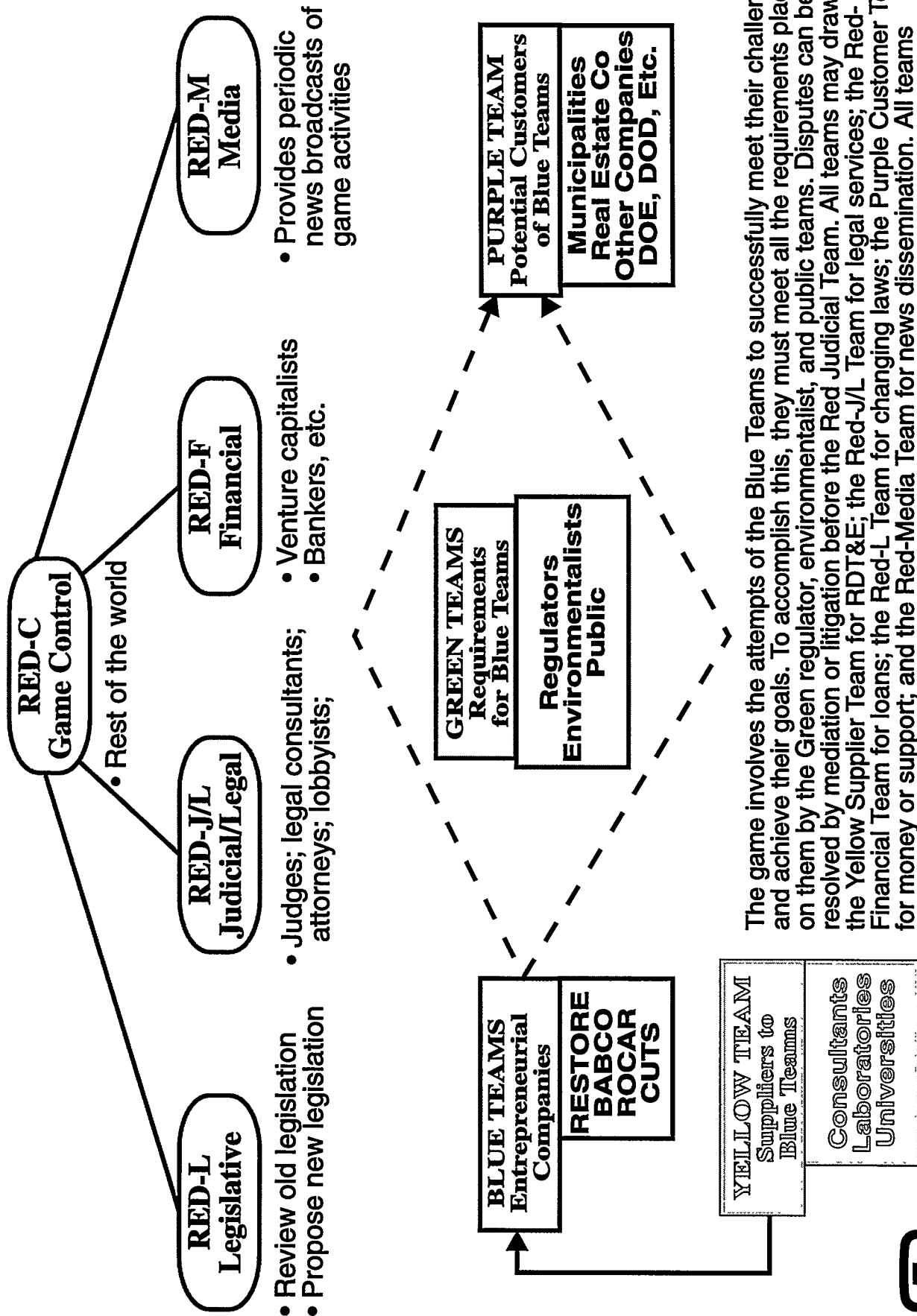
Team Descriptions

Blue Teams (entrepreneurs, businesses):

The Blue Teams are each provided with a fixed amount of money (\$10M for the duration of the game) to spend to pass the requirements developed by the environmental teams (federal, state and local, the public, and environmentalists). They may also seek additional finances from the bankers or venture capitalists (or even potential customers), if they can convince them of the soundness of such an investment. If their products are in need of additional research and development and/or testing, they may contract with the Yellow Team for help. Attorneys on the Red-J/L (judicial/ legal)Team are also available for consultation or lobbying at a negotiated price. The Purple Team may also partner with and support the entrepreneurs during the play of the game.

Appendix C provides a fictitious sample of play for a Blue Team. Appendix D provides a balance sheet form to be used by all Blue Team analysts and recorders for this game. Appendix E is the requirement form that must be used by all Blue and Green Teams in determining whether a requirement has been successfully completed. Appendix F provides an agreement form that should be used as written documentation for all deals, contracts, purchases, and agreements between any teams over the course of the game. No deals can be considered valid without a written contract

Figure 1. ENVIRONMENTAL PROSPERITY GAME SCHEMATIC



The game involves the attempts of the Blue Teams to successfully meet their challenges and achieve their goals. To accomplish this, they must meet all the requirements placed on them by the Green regulator, environmentalist, and public teams. Disputes can be resolved by mediation or litigation before the Red Judicial Team. All teams may draw on: the Yellow Supplier Team for RDT&E; the Red-J/L Team for legal services; the Red-Financial Team for loans; the Red-L Team for changing laws; the Purple Customer Team for money or support; and the Red-Media Team for news dissemination. All teams should play their roles as in real life. Game "duration" is five years.



signed and dated by the parties and by the Control Team. Appendix G is a sample business plan that could assist Blue Teams in procuring loans from the Red-Financial Team. Appendix K provides some environmental background information including a brief history of major US environmental law, permits necessary for landfills in California, and technology certification in California. Appendix L is a glossary of terms and acronyms used in this handbook.

Blue Teams 1 (Restore) and 2 (Babco) represent single companies. Blue Teams 3 (ROCAR) and 4 (CUTS) represent partnerships between two companies, one large and one small entrepreneurial company with a technology solution. For Blue Teams 3 and 4, only the large companies receive the \$10M. The two smaller companies may seek funding only from outside sources.

Green Teams:

Green-R (Regulators):

In the first session, the Green-R Team will separate into three groups representing the USEPA and two state or regional groups (e.g., the Manuel Air Quality Management District, the San Manuel County Environmental Health Agency, the Grimesville Water Quality Board, etc.). Each of these three groups will then provide one requirement (in writing using the form in Appendix E) specific to each Blue entrepreneur team that must be overcome in order to receive a permit to use their technology or products. The Green-R Team can request the status of permitting of each Blue Team, and develop their requirements any way they choose (in accordance with existing environmental law), but they must not exceed one requirement per group, or three total. The scenarios provide the only information that the regulators must consider. The regulators can evaluate additional claims

by the Blue Teams, but the regulators are the sole determinants of their requirements.

Green-E (Environmentalists) and Green-P (Public):

The Green-E and Green-P Teams develop their own requirements (no more than two from each) that the entrepreneurial teams must pass. They may also review the Green-R requirements and accept or oppose them. If they oppose some (possibly because they are believed to inadequately protect the environment), they may prepare a brief to present to the Red-J/L Team judges for resolution. They may also seek legislative changes from the Red-L Team legislators. The Green-E and Green-P Teams are provided with \$2M each that can be saved or spent over the five-year duration of the game. This money can be used to file suits, pay court costs, initiate legislation, hire consultants, conduct research, or even to invest in environmental technologies that they like (in the form of grants or small business research and development contracts). This report contains a preliminary list of suggested requirements (see page 40); they are provided only as guidance -- the Green Teams develop their own requirements.

The entrepreneurial teams must convince the Green Teams that they have overcome each requirement or hurdle; this is accomplished by a written (and oral) presentation from the Blue Team to the Green Team which results in a majority of the Green Team members agreeing. If the Green Team disallows a requirement, the Blue Team can try again, seek support from other agencies or legislators, buy additional technical support, or file a suit. Five sessions (years) will be available to overcome the requirements.

The Green-E Team should divide its membership up to faithfully represent different

elements of the environmental community, not all of whom are in agreement. Examples might include the Rockies Club, Citizens Against Suspicious Technologies (CAST), Californians for Environmental Justice (CEJ), The Greenbelt Association, etc. Similarly, the Green-P Team should subdivide into several groups; e.g., San Manuel and Grimesville Chambers of Commerce, the Country Club Neighborhood Association, Businesses for Sustained Development, Democrat-Republicans for Progress, etc. All Green-P players live in either San Manuel or Grimesville.

Yellow Team:

The Yellow (consultant/laboratory/university/business incubator) Team can provide advice (for a fee), act as a testing or certification lab, an honest broker, or a source for additional development of a technology. Success or failure of R&D investments will be probabilistic. The labs and universities can estimate the investment required for a 50% probability of technical success. A normal distribution will be generated and the success or failure of the investment will be determined probabilistically - the higher the investment, the more likely it will be successful. [We recognize that other factors besides investment can influence research outcomes; however, in the game context, the ratio of investment to estimated mean (50% probability) investment was chosen as the most feasible approach to introducing uncertainty while still maintaining some aspects of reality.] The Yellow Team is provided with \$2M that can be used as matching funds for R&D, CRADAs, support for new technology development or other appropriate uses. The Yellow Team may request additional funding from the legislature (Red-L) in 1997 (Session 3 only). The Yellow Team players can assist the other teams in their presentations, in the court cases, etc. Appendix F forms must be used for all

agreements. Research and testing results will be recorded on those forms by Control.

Purple Team:

The Purple (customer) Team is composed of several possible customers for the Blue technologies, including (but not limited to) businesses (e.g., Urban Sprawl Development Corporation, Galaxy Business Machines, Choco Chip Semiconductors, Awesome Aerospace, Gary Motors Corp. (GMC), Western Gas & Electric, Sludgeco Industries, etc.), municipalities (e.g., the mayors of San Manuel and Grimesville, the San Manuel County Board of Supervisors, the Country Club Neighborhood Association, etc.), military bases (e.g., Alameda Naval Base), DOE waste sites, national laboratory sites (as customers/contractors), other industries, municipal sewage and solid waste departments, and even foreign governments or companies (dual roles are permitted). Customers can choose between competing products, or support several of the Blue Teams. Each Purple Team player will be given \$200,000 for each session (years 1995 to 2000). They may spend this money to further their own causes, either independently or in partnership with other customers. The Purple Team should identify its problems, possible solutions, impact of regulations, procurement problems, etc., and provide these to the appropriate teams.

Red Teams:

Red-J/L

The Red-J/L (judicial/legal) Team performs two functions. If necessary during the course of the game, it can hear lawsuits (or requests for mediation) from any other team. It may issue injunctions against any party after hearing the evidence. Its decisions are final - no appeal. Filing a court case will cost both the plaintiff and defendant money according to the attached table of services, Table 1. This

Table is provided as guidance; The Red J/L can alter their rules and costs as they see fit. Additional fines or punitive damages can be assessed at the discretion of the judges. The

Red-J/L players are lawyers and judges already knowledgeable about environmental laws and regulations.

TABLE 1: DISPUTE RESOLUTION

DEFINITIONS

Mediation: Mediated disputes will be settled through minimal intervention by the mediator. Disputing parties will be expected to bring disputes that can be resolved expeditiously and provide all the data and information in a framework that will support expeditious resolution. Resolutions that cannot be reached expeditiously can be arbitrated or litigated. Resolutions that cannot be reached within the time allotted, must be arbitrated or mediated.

Mediation is best suited for controversies that are multi-party, multi-issue and multi-interest oriented.

Arbitration: The arbitrator will act as the party responsible for providing a solution to the disputing parties. Disputing parties will be expected to bring their case in a manner most conducive to expeditious resolution.

Arbitration is best suited to a few well-defined issues that cannot be resolved through mediation.

Litigation: Litigation is the “last resort” dispute resolution option that should be reserved for controversies that cannot be effectively mediated or arbitrated.

**IN THE MATTER OF THE ENVIRONMENTAL PROSPERITY GAME
JUDICIAL RULES IN THE STATE OF CALIFORNIA**

STATEMENT OF PURPOSE AND BASIS:

The Judicial Team has instituted rules for parties interested in seeking resolution to matters in conflict or dispute on account of the complexity of environmental issues. These rules were developed to facilitate the process of resolving conflicts in a timely and cost-effective manner. These rules are binding on parties petitioning this Court.

RULES:

Rule #1: Parties seeking resolution of matters in dispute or conflict have three options available to them: **mediation, non-binding arbitration and litigation.**

Rule #2: Filing fees will be assessed in accordance with the following schedule:

Non-binding mediation	\$200,000 per party
Non-binding arbitration	\$500,000 per party
Binding litigation	\$1 million per party

Rule #3: The parties can expect that the following time allocations will be required for pursuing each of the options for resolution:

Non-binding mediation	10 minutes
Non-binding arbitration	20 minutes
Binding litigation	30 minutes

Rule #4: Parties seeking judicial assistance must file an application with the Court prior to appearance that includes the following information:

1. Names and representatives of the party.
2. Choice of the resolution option selected.
3. Identification of the legal issues involved including appropriate citations to applicable statutory and regulatory provisions, and/or common law principles.
4. Identification of any relevant technological issues or uncertainties related to the dispute or controversy.
5. Identification of the principal interests involved in the dispute.
6. Identification of the possible alternative solutions to the dispute.
7. A list of the facts or circumstances including agreements among the parties to the dispute.

Rule #5: Fees must be paid before the parties appear before the court.

The second function of Red-J/L players is to provide legal services to any team requesting them at negotiated prices. They can consult with the Blue, Green, Yellow, and Purple teams to provide advice, lobbying assistance, attending hearings on pending legislation as advocates, or as lawyers in court. Players that present briefs in court for the plaintiff or defendant teams may of course not simultaneously sit as judges.

Red-F (Financial):

The Red-F (financial) Team (bankers, venture capitalists, etc.) can provide additional funds to other teams under any conditions acceptable to both parties. The funds can be used for R&D, testing, building plants and equipment, lobbying for legislation, advertisements in the media, or any other acceptable purposes. In Session 1 (1995), each player on the Red-F Team will receive \$1M. They may act individually or team with other Red-F players to invest their funds. The growth of their investments will depend on interest and dividends received over the course of the game. Additional investment capital will be provided in 1997 (\$1 M per player) and 1999 (\$1M per player). The Red-F Team should discuss the risks and legal liabilities of their possible investments, and create investment teams as they wish.

Red-M (Media):

The Red-M (media) Team includes representatives of the media, including journalists and local and national TV anchors. They monitor the game and report on the proceedings in short news reports throughout the game. The media can respond to the activists, entrepreneurs, or regulators as they wish, and their reports may be able to impact the game direction and outcome. The teams may treat the media as they would in real life: talking, informing, complaining, seeking

support, etc. The media may also sell ads for publication at negotiated costs.

Red-L (Legislative):

The Red-L (legislative) Team can decide to represent only the state legislature, or split into federal and state houses. They will debate the bills already in the hopper and propose new laws as they see fit. They may also seek out other players' (their constituencies) opinions and hold public hearings. They may also choose to investigate other bodies or seek evidence for proposed legislation. Any group desiring the passage of a new law may prepare a bill, and pay the Legislative Team \$100K to have the bill placed in the legislative hopper. Proposed laws will pass if they receive a majority of the votes from the Red-L players. The legislative team might also discuss the key question of "What is clean enough?" and how to have laws reflect this situation. They may pursue any other areas deemed appropriate for a legislature.

The legislature will receive tax revenues of \$1M in each year beginning in 1996. They may spend these funds any way they choose, based on a majority vote.

Team Goals

The primary and secondary goals of the entrepreneur teams are to make money and to protect the environment, respectively. The regulatory teams want to protect the environment without unduly hindering the efforts of the entrepreneurs to make money. The environmentalists main goal is protection of the environment. The public's main goal will be determined by the players, but will probably represent a blend of environmental protection with sustainable economic growth. The customers (Purple Team) want their sites cleaned efficiently and at low cost; they may also promote the introduction of new environmental technologies into the

marketplace through technology certification. The Red-F Team's goal is to maximize the return on their investment.

Entrepreneur teams can appeal any regulations based on their understanding of the law, including scientific bases, undue burdens, or constitutional issues.

All teams (and players) should keep a record of income and expenditures over the course of the game; this information will be used in the preparation of the final game report.

Any team that goes bankrupt must file Chapter 11 and go to court. The judges will dispose of the case as they see fit. Table 2 lists the income and payment dates for each team.

At the end of the game, players from each team will summarize the highlights of the play and the lessons learned. The players will fill out evaluation sheets and provide their comments.

TABLE 2. TEAM AND PLAYER EXTERNAL INCOME

Team	1995	1996	1997	1998	1999	2000
Blue 1 - Restore	\$10M	0	0	0	0	0
Blue 2-Babco	\$10M	0	0	0	0	0
Blue 3-Big Oil	\$10M	0	0	0	0	0
Blue 3-Clohi	0	0	0	0	0	0
Blue 4-Behemoth	\$10M	0	0	0	0	0
Blue 4-Electra	0	0	0	0	0	0
Green-Regulators	0	0	0	0	0	0
Green-Environmentalists	\$2M	0	0	0	0	0
Green-Public	\$2M	0	0	0	0	0
Yellow	\$2M	0	0	0	0	0
Purple: Each player	\$200K	\$200K	\$200K	\$200K	\$200K	\$200K
Red J/L	0	0	0	0	0	0
Red-Financial: Each player	\$1M	0	\$1M	0	\$1M	0
Red-Media	0	0	0	0	0	0
Red-Legislative	0	\$1M	\$1M	\$1M	\$1M	\$1M

Karma Kards:

The role of Karma Kards is to inject into the game some elements of the real world that are unpredictable, and that the players are forced to accommodate and manage. The Kards can exert either positive or negative influences on the teams' progress. However, the Kards were designed to have a relatively small or moderate effect, so that the teams' success or failure depended predominantly on their own actions. Kards were also included that would require players to exchange teams; this would allow some players to experience the environmental processes from perspectives different from their real life roles. Kards were drawn at the start of each session.

All Blue Teams:

- You receive 10 minutes of a legal consultant's time (Red J/L Team). Value = \$10,000. (Give card to lobbyist.)
- You receive 10 minutes of a supplier's consulting time (Yellow Team). Value = \$10,000. (Give card to supplier.)
- You may submit one bill into the legislative hopper. Value = \$100,000. Give to Red-L.
- You receive an international grant of \$1M for Certified Technology Transfer and expansion. This money can only be used in negotiating contracts with foreign customers on the Purple Team.
- One new member has been added to the Green-Public Team who is sympathetic to your company (the CEO's cousin). You receive one proxy vote in favor of passing a Green-P requirement.
- One new member has been added to the Green-Environmental Team who is sympathetic to your company. You receive one proxy vote in favor of passing a Green-E requirement.
- One new member has been added to the Green-Regulator Team who is sympathetic to your company (and coincidentally is the president's brother-in-law). You receive one proxy vote in favor of passing one of four Green-R requirements.
- You receive a \$1M grant to be spent only at a national laboratory (Yellow Team) for research, development, testing or model development.
- You are able to change the opinion of one of the judges who might vote against you in the next law suit; with this Kard (and a threat to expose an illicit affair), a single judge's negative opinion is reversed.
- You gain additional key patent protection for your technology. Collect \$1M.
- A competitor disputes a key patent that you need for your product. You lose \$1M (in legal fees) to fight his patent claim.
- You are fined \$1M for environmental pollution.
- You win a government grant of \$1M.
- One player on your team must leave and exchange places with a regulator team member.
- One player on your team must leave and exchange places with an environmentalist team member.
- One player on your team must leave and exchange places with a member of the public.

Blue 1 - Restore:

- As a result of 40 days and nights of rain, there has been significant erosion of the Air Force Base site. You must prepare a brief response to the news media discussing why your landfill concept will not be affected by heavy rains.

Blue 2 - Babco:

- CATT (California Think Tank) has just published a study arguing that battery-powered cars are a waste of money, will not help the environment, and will never be accepted by the public. You must prepare a news release refuting this study.

Blue 3 - ROCAR:

- The USEPA is interested in your technology. They have issued a grant of \$400,000 for a pilot study of on-site VOC

treatment technology for soil and groundwater cleanup at a selected superfund site.

Blue 4 - CUTS:

- The USEPA is interested in your technology. They have issued a grant of \$400,000 for a pilot study of on-site VOC treatment technology for soil and groundwater cleanup at a selected superfund site.
- Additional contamination has been found on 20 acres of your site, previously thought to have only low levels. The levels are now estimated to be five times higher, raising your clean-up costs appropriately. This information must be released to the news media.
- Contamination on the 20 acres of your site has been found to be five times lower than previously thought, lowering your clean-up costs appropriately. This information must be released to the news media.

For Green-E Environmentalists) And Green-P (Public) Teams:

- Go to jail for violating a court order on picketing (i.e., \$100,000 fine).
- Get out of jail free. Value = \$100,000.
- You are able to change the opinion of one of the judges who might vote against you in the next law suit; with this Kard (and a threat to expose an illicit affair), a single judge's negative opinion is reversed.
- For meritorious service, you receive a \$1M grant for environmental protection.
- Your community loses 5000 jobs. You lose \$1M.
- If you have previously allowed any Blue Team to pass a requirement, you receive \$1M which represents the creation of 200 new jobs in the application of a new certified environmental remediation technology. If no requirements have been passed, this card is void.

- You are permitted to introduce one new bill to the legislature without a lobbying fee. Value = \$100,000. Give to Red-L.
- A rich environmentalist dies and leaves you \$1M in his will.
- You receive 10 minutes of a legal consultant's time (Red-J/L). Value = \$10,000. (Give card to lobbyist.)
- You receive 10 minutes of a supplier's consulting time (Yellow Team). Value = \$10,000. (Give card to lobbyist.)
- You may add one additional requirement for a designated Blue Team.
- One player on your team must leave and exchange places with an entrepreneur team member.

For Green-R Team:

- You are able to change the opinion of one of the judges who might vote against you in the next law suit; with this Kard (and a threat to expose an illicit affair), a single judge's negative opinion is reversed.
- As a favor to your brother-in-law, one player must donate ten minutes of his/her time to advise a Blue Team on how best to meet your requirement.
- As a favor to your nephew, one player must donate ten minutes of his/her time to advise a Blue Team on how best to meet your requirement.
- Asbestos has been found in your office spaces. During remediation, you must split up and wander around the room for ten minutes.
- You may add one additional requirement for a designated Blue Team.
- The administration has cut your budget. One player on your team has been laid off, but has been offered a job in industry. Exchange places with an entrepreneur team member.

Rules Of Play

BANKRUPTCY:

A Blue Team may maintain a zero balance. However, if the balance goes negative, the Blue Team goes into Chapter 11 bankruptcy; the court (Red-J) then decides on the required actions and determines when or whether the team may resume play.

BOOKKEEPING:

All bookkeeping will be performed by the recorders or analysts assigned to each team. They will make the appropriate entries and keep the books up-to-date. Team members can verify accuracy whenever they choose.

CONTRACTS:

Contracts or agreements can be carried out between any two or more teams. A Control Team member must be present at the formalization of any contract, which must be in writing; a member of the Control Team must sign and date the agreement for it to be valid. If the success or failure of the contract is determined probabilistically, Control will perform the necessary calculations and report the results to the parties immediately. In contracting for services from the Yellow (consultants/lab/university) Team, the Yellow Team will attempt to realistically estimate the costs of providing a service or product that would yield a 50% probability of success. Half this cost will be taken as one standard deviation. Success or failure will then be determined by sampling from a normal distribution with the actual sum invested by the Blue Team. For example, investing 50% more than the median estimate will yield a probability of success of 84.1%; investing twice the median estimate will produce a probability of success of 97.7%. When contracting for consultant or legal services, the consultants may provide advice, help draft the Blue presentations, and even appear on their behalf at the presentations to the Green Teams. Services of the Yellow and Red-J/L teams are available to all teams at negotiated prices.

DISPUTES:

All disputes will be resolved by the Control Team, whose decisions are binding.

EXCHANGE OF PLAYERS:

When a Karma Kard requires the exchange of players between two teams, the teams will first be asked for volunteers. If there are no volunteers, the exchanged players will be chosen by selecting straws. The process will be monitored by the Control Team. Players are obligated to come up to speed as quickly as they can on their own, and should not slow the new team's progress. Players should adopt the perspectives of their new team, and play their roles authentically. Exchanged players will remain with their new teams for the remainder of the game.

FINANCING:

All teams have several avenues available for procuring funding. They may borrow directly from the Red-F Team bankers or venture capitalists in exchange for a share of equity or by paying interest. The Red-F Team will determine its own requirements for lending. Blue Teams may also seek grants or investments from potential customers (Purple), or matching funds or grants from the laboratories (Yellow).

KARMA KARDS:

At the start of each session, the Blue and Green Teams will select a card from a shuffled deck, handed to them by the team facilitator or analyst. The instructions must be carried out immediately.

LAWSUITS:

Lawsuits can be filed at any time by any team. An odd number (at least 3) of judges must hear the case. After both sides have presented their arguments, the judges decide by majority rule. Judges' decisions are final and binding. Litigants must appear before the judges at their scheduled times. If one litigant is one minute late, a judgment will be immediately rendered in favor of the litigant who is present. If both litigants are five minutes late, the case will be dismissed;

the litigants will need to reschedule their court times.

LEGISLATION:

If the Blue Teams are unable to overcome a requirement, they may seek legislative relief. Seeking new legislation costs \$100,000. The proposed new law should be presented in writing. The Red-L Team can hear legislative proposals at any time, hold public hearings, and conduct open or secret debates. By a majority vote of at least two players, they may decide to pass the legislation as proposed; they may also decide to modify the legislation as they wish. If the law is passed, a copy of it is immediately transmitted to all other teams. The law is binding, but may be challenged in court. If challenged by any team, the rule on lawsuits applies.

PRESENTATIONS:

A standard form (Appendix E) will be used by the Blue Teams in claiming that they have passed a requirement. The form will include the Blue Team number, the requirement description and the Green Team which produced it. Arguments should be presented in brief bullet form. Space will be provided for notes on the presentation discussion. A completed form signed by a Control Team official will be required for proof of passing or failing the requirement.

PROXIES:

A team member may be away from his/her team because of litigation, negotiating with other teams, making deals, talking to Control, being interviewed, etc. If he chooses, he may leave his proxy vote (in writing) on an upcoming issue. The facilitator will then cast that vote as if the player were present.

Some Karma Kards allow proxy votes; these may be used for any single vote, and act like an additional voting player.

REQUIREMENTS:

The Green (regulators, environmentalists and the public) Teams each develop requirements

that must be overcome by the Blue (entrepreneur) Teams. In the initial sessions, each Blue Team is assigned to make a presentation to each Green Team in a specified sequence. After each Blue Team has presented to all the Green Teams, subsequent meetings are planned by appointment. The Green Teams read the arguments of the Blue Teams and hear additional oral presentations. If they are convinced that the requirement has been met, they vote to approve the Blue Team product or technology. A majority vote is binding. The Green Team can (and should) provide guidance to the Blue Team as to what needs to be done (further R&D, testing, etc.) to make the product acceptable. Requirements once overcome cannot be rescinded unless a Green Team believes that the Blue Team has not lived up to its obligations; i.e., their product does not meet environmental requirements, or their presentation has omitted or obscured certain facts. If the Green Team wishes to rescind a previously passed requirement, they must bring a suit before the Red-J/L (judicial/legal) Team.

If a Blue Team finishes its presentations early with its assigned Green Teams in sessions 2-5, it may schedule a presentation with another Green Team (if and when they are free) to either make a new presentation or revisit a requirement which was previously denied.

SCHEDULES, APPOINTMENTS

It is essential that all players strictly follow the agenda and be on time for their appointments. Penalties will be assessed for teams that are late.

TIES:

In the case of tie votes by the Green or Red Teams (due to an even number of players), the Control Team will flip a coin to make the final determination.

Blue Team Scenarios

Blue Team 1 - Restore, Inc.

Company Structure, History, and Products:

Restore, Inc. designs, constructs and operates modern landfills. They have been in business since 1982, serving communities in California, Oregon and Nevada. They have grown to 2300 employees in 18 facilities located in the three states. They also operate a small research laboratory in San Jose that investigates new concepts for more environmentally benign landfills. Restore had net sales of \$250 million in 1994, with a net income after taxes of \$12 million. Their stock is traded over the counter with 50 million shares outstanding; the most recent stock price was \$3.50 per share.

Restore would like to become a national company serving all states. They have developed a complete solid waste system that they claim is the most technically advanced and environmentally acceptable process in the country. The three-pronged Restore system includes: 1) a recycling program covering 50% of the total waste; 2) composting 25% of the waste and converting it into materials for agricultural fertilizers and soil enrichers; and 3) disposing of the remainder of the waste (25%) into a modern landfill. This landfill will be triple-lined and have full leachate and methane controls. The chemical consistency of the collected and treated leachate makes it usable as a critical component for hydrogen fuel cells which have applications for electrically powered vehicles. The methane gas drawn off from the landfill will be sold to Western Gas & Electric for electricity generation.

Restore wants its landfill system to become the model for the rest of the US. They expect that it will set industry standards well into the 21st century.

Scenario:

San Manuel is a California community of 50,000 people located on the Turkee River estuary, which flows into the Pacific Ocean. San Manuel County has a population of 200,000. San Manuel is economically depressed. There has been a steady exodus of young people because of a lack of jobs in the area; the county's unemployment rate is currently 18%. Manufacturing, fishing, and logging have been declining for many years; even some high-tech software companies are discussing plans to relocate away from San Manuel. Most recently, the US Air Force has shut down the San Manuel base, further reducing the number of jobs and income available to the area. However, the community considers itself among the most environmentally conscious cities in the state. The last election has resulted in a shift in political leadership in the city and county; it produced a mix of officials, some of whom strongly support economic development in the community, and others who remain strongly committed to environmental protection, even at the cost of economic development.

Restore has petitioned the County Board of Supervisors for the necessary permits to design, construct and operate their landfill and sewage treatment concept on 160 acres of the site of the closed Air Force base on the north end of town, about one mile from the San Manuel Country Club. The company claims that their facility will collect and process all the refuse of the entire county (more than 450 tons per day). Restore has described a 20-year plan over which the landfill would gradually be replaced by a marina, a baseball park, a landing strip for model airplanes, and eventually an industrial and commercial park. Several companies have been approached to buy or lease space in the vicinity of the landfill, including waterfront property.

The California State Environmental Protection Agency is also studying the San Manuel

situation. Although the initial reactions have been favorable, Cal EPA has advised Restore that their project will be scrutinized more closely than those which use existing technology. In particular, attention will be paid to trace levels of heavy metals and toxic chemicals.

San Manuel's current landfills will not reach capacity for at least one year. The city and county have been offered competitive proposals for alternative conventional landfills that would be sited in blighted urban neighborhoods or on currently unproductive farm land. The conventional landfills are comparable in total costs to the more technologically advanced Restore proposal, primarily due to the land donated by the military for the Restore project; the DoD has refused to provide this land for a conventional landfill disposal system. Some members of the community have expressed concern that property values will fall substantially in the neighborhood of the facility.

The San Manuel Observer, the local newspaper, has strongly supported the Restore project in its editorials. "We must do something proactive for our community," said editor Mike Dufus. He staunchly defends this project despite criticism from some environmental groups and citizens, including his wife, an environmental activist. She has recently threatened divorce unless Dufus ceases promoting this facility.

Issues and Challenges:

Financial:

The company has estimated the initial cost of facility construction at \$23.2 million including land, or \$21.6 million if the military base is used. Tipping fees, currently estimated at \$35/ton, would be negotiated and should be less than conventional facilities. The Department of Defense has offered the closed military base as a site for the facility at no cost. This DoD grant makes the San Manuel site especially attractive to Restore to

demonstrate its new landfill concept. However, the clean-up costs of the base could be significant and no agreements have yet been reached by Restore, DoD, or San Manuel. Other communities have also expressed interest, but Restore is willing to give San Manuel an option on this first-of-a-kind system. Although Restore has raised \$16 million, it needs more investors, and would also like tax breaks and other incentives from the city and county of San Manuel. Restore estimates that it would barely break even on this facility; its incentive is to get the demonstration plant up and running to garner a large domestic and foreign market. Some citizens have stated that Restore's costs are grossly exaggerated. They feel that Restore should complete the project at a much lower cost, even at a loss. They believe that Restore will more than recoup its investments through publicity and future customers. Some feel that Restore should also pick up the base clean-up costs, but Restore is resisting this strenuously.

Technology:

Restore has developed a new type of anaerobic bacteria to accelerate the decomposition of municipal solid waste. This biologically accelerated decomposition (BAD) process decomposes waste into methane, water, carbon dioxide, and residuals in six months, rather than the 15 to 20 years required for decomposition in conventional landfills. They claim that the BAD process produces 66% more methane gas in much less time (2.5 cu. ft. per pound of waste in six months compared to 1.5 cu. ft. per pound in 15 years). It also reduces the volume of residual waste by 50%. However, these results are based on laboratory-scale tests only. There has been no large-scale testing, and only very simple computer models have been developed. Restore hopes that the proposed San Manuel demonstration facility will allow them to skip the plant pilot phase (1/4 scale) and provide complete validation of the technology.

Restore has also developed new sorting and marking processes to separate biodegradable from non-biodegradable wastes; this will allow cheaper and faster methods for separating glass, ferrous and nonferrous metals, tires, paper, plastics, etc. They have also been discussing a Cooperative Research and Development Agreement (CRADA) with Jefferson National Laboratory to embed microchips in plastics manufacturing to assist later sorting.

Permitting:

Restore company officials have privately admitted that they are completely confused by the permitting process in California. No government agency seems to have final approval authority. Furthermore, approval by one local or regional board does not seem to grant approval even for neighboring counties and regions, nor elsewhere in the state. Restore also believes that meeting all current regulations would not protect them from new and more onerous environmental restrictions in the future. Restore would like to work with government agencies to develop one-stop shopping for permitting that would be accepted throughout the state, and to create some stability with respect to future obligations.

Siting:

The traffic to and from the landfill and the recycling center/transfer station (25 trucks a day) will go down Country Club Lane, a prime residential area of San Manuel. Further, a large sewer line will have to be installed which will cut across the 9th green of the golf course, requiring the green to be relocated 100 yards to the east. The Country Club Neighborhood Association has opposed this site, although they favor the landfill concept. They have proposed an alternative site in a blighted area on the south side of town. However, a local activists group, Californians for Environmental Justice (CEJ), claimed that this alternative site is another example of "dumping" on minority neighborhoods. They

claim that "environmental justice" would be served by the existing north-side site.

Odors:

The company has stated that the landfill will emit no obnoxious odors. Their patented suite of bacteria should eat the odor-causing materials, and greatly reduce the emissions of hydrogen sulfide, ammonia, nitrates and nitrites, and other chemicals. Several citizens have claimed that they want additional assurances that this is the case. They believe that the company's claims must be verified by neutral scientific organizations, especially at the large scales of the actual facility.

Environmental Impact:

The facility would be located on the estuary of the Turkee River, connected directly to the bay and the ocean. If the facility were poorly designed or operated, it could cause damage to the salmon migration up the Turkee River. A local law firm has been retained by an unnamed organization, to oppose the facility in the courts. The lawyer states that environmental damage "is certain," and that the company's application for permits must be denied.

The environmental activist community is split on Restore. One individual expressed the private thought that "the devil is in the details." Some environmental groups are strongly opposed until considerable additional studies have been done on long-term safety, operational accidents, environmental impact, and specific recycling technologies.

Timing:

The company has been negotiating with the county for six months. Investors are becoming anxious and impatient. Restore has decided that it can only grant the county six more months to make a decision. After that, they will begin to negotiate with other California communities for this first demonstration plant and landfill concept. In fact, Restore has already been contacted by a coastal community further to the south, where

a coalition of community leaders has expressed an interest in siting the facility.

Foreign Involvement

Restore has opened negotiations with communities in Japan, Mexico and Russia. They believe that the potential global market is much larger than the US market. Although they would like to develop and prove their

concepts in the US, they will seriously pursue foreign partnerships. If the San Manuel facility is approved, they would use it as a demonstration. However, they have not ruled out building a demonstration plant in a foreign country.

COSTS FOR RESTORE FACILITY - 1995 ESTIMATE

	<u>\$000</u>
Land (160 acres, \$10K per acre)	1600 [†]
Equipment	1500
On-site improvements (including sewage treatment plant)	5000
Off-site improvements	2000
Liners	4000
Leachate control system	1200
Composting arena	800
Excavation	500
Transfer station/recycling unit	1200
Trucks - transfer (8 trucks)	<u>1600</u>
Subtotal	\$19,400
Contingency	<u>3800</u>
Total	\$23,200*

[†]No cost if the closed military base is used.

*No clean-up costs included for military base or proposed sewer line.

RCRA Requirements for Municipal Landfills: Subtitle D

- Liner with hydraulic conductivity 1×10^{-5} cm/s
 - Cover with 2 ft soil cover minimum (6" top soil + 18" compacted soil with hydraulic conductivity 1×10^{-5} cm/s or equivalent to that of liner, whichever is better.
 - Leachate collection system
 - Ground Water Monitoring System
 - Follow Clean Water & Clean Air Acts
-

Consolidated Financial Statements
Restore, Inc.

Income Statement
[**\$ in millions**]
for the year ended Dec 31, 1994

Operating Revenues from Sales	\$250
Operating Expenses	\$233
Salaries	13
Benefits	3
Selling Expense	172
Administrative & R&D	45
Net Income from Operations	\$17
Income Taxes	5
Net Income After Taxes	\$12

Balance Sheet
[**\$ in millions**]
as of Dec 31, 1994

Current Assets	\$225
Cash	11
Receivables	28
Property, Plant, Equip	119
Intangibles [BAD&Sort Technologies]	25
Inventories	42
Current Liabilities	\$ 73
Accounts Payable	40
Notes Payable	25
Accrued Taxes Payable	8
Stockholder's Equity	\$152

Statement of Cash Position
[**\$ in millions**]
for the year ended Dec 31, 1994

Sources of Cash	
Net Income	\$12
Effects of changes in Operating Capital:	
Increase in Accts Receivable	(10)
Decrease in Inventories	5
Increase in Accts Payable	22
Issuance of Common Stock-Additional Shares	10
Total Sources of Cash	\$39
Uses of Cash	
Purchase Treasury Bills	\$24
Dividends Declared and Paid	\$13
Change in Cash Position	\$ 2
Cash, Dec 31, 1993	\$ 9
Cash, Dec 31, 1994	\$11

Stock Position: 50 Million Shares outstanding	Market Value \$3.50/share	Book Value \$3.04/share
Dividends: \$0.25/share	P/E Multiple: 14	

Blue Team 2 - Babco

Company Structure, History, and Products:

The Bay Area Battery Co. (Babco), located in Oakland, CA, manufactures a variety of storage batteries for industrial applications. Their products are sold in California, Arizona, Texas, Ohio, and New York. They have been in business since 1987 and have grown to 700 employees. In 1991, they opened a second facility near Los Angeles. Babco has a small research laboratory and pilot facility in Novato, CA, where they have been conducting feasibility studies on a novel lithium-polymer battery that they developed in 1992. They hold several patents on this new battery. Babco had net sales of \$75 million in 1994, with a net income after taxes of \$3.9 million. Their stock is traded over the counter with 10 million shares outstanding. The most recent stock price was \$5.60 per share.

Babco would like to become a major player in the emerging electric vehicle market in California and the nation. In laboratory tests, their prototype lithium-polymer battery exceeded the targets established by the USABC (US Advanced Battery Consortium) -- specific energy 200 Watt-hours/kg and peak power 400 Watts/kg. They have tentatively named this new battery *Nirvana*. The battery has been field-tested in six cars, all of which have been successfully driven in excess of 100,000 miles, with an average city-driving single-charge mileage of 159 miles. With minor improvements, Babco is certain that it can raise this range beyond 200 miles. Babco has utilized life-cycle assessment (LCA) methodologies to design a factory-of-the future concept for an environmentally conscious, energy efficient manufacturing facility. Bench tests and computer simulations at their Novato research laboratory have clearly demonstrated the feasibility of a "zero-effluent" electric battery manufacturing plant. Babco wants to build a prototype production

facility that would set the industry standards for the 21st century and that would establish a leading position for them in the future electric vehicle industry.

Scenario:

In 1990, environmental officials in California told auto makers that by 1998, 2 percent of their annual sales in California must consist of "zero-emission vehicles" completely free of exhaust pollution -- a standard that can only be met by electric cars. The target will jump to 5 percent in 2001 and to 10 percent in 2003. California's standards have recently been adopted by New York and Massachusetts, and a move to institute a similar program throughout the Northeast was approved early last year by a majority of the twelve states involved. The measure is currently before the Environmental Protection Agency (EPA). On May 13, 1994, the California Air Resources Board (CARB) voted to uphold a mandate requiring the auto industry to sell electric-powered cars in the state by 1998.

This decision paves the way for investment and new jobs in a new industry. Separate economic studies have estimated that 10,000 to 70,000 jobs would be created by 2010 if CARB stuck by its original mandate. But electric cars still leave much to be desired. The batteries within today's models (primarily lead-acid) store only a fraction of the energy produced from a tankful of gasoline. This restricts the vehicles to a range of approximately 100 miles, and only about half of that in stop-and-go traffic or when headlights or other accessories are in use. Nevertheless, consumers will be attracted to advanced electric vehicles that are quiet, need little maintenance, and can be recharged at home rather than at a service station. A major key to the success of the electric vehicle is the need for an advanced battery that would provide an extended operating range of more than 200 miles between recharges.

Babco would like to construct a new 100,000 sq-ft manufacturing plant for its *Nirvana* battery. The new plant will cost \$38.6 million to construct and bring on line, and will require extensive financing. Approximately 75 jobs will be created by the new factory during the first year of operation. It is expected that at full capacity, during the third year, there will be approximately 200 workers at the new facility. Babco has selected Grimesville, CA, a community of 75,000 people south of Oakland, for its new facility. Grimesville is an economically depressed community, which has experienced a steady decline in jobs as a result of a loss of its manufacturing base and has had trouble attracting new industries because of severe environmental and permitting regulations. At one time, the community was heavily involved in electroplating and surface finishing, but most of the plants have closed, and there has been a steady exodus of young people due to a lack of jobs. The current unemployment rate is more than 15%. This is an old industrial area with a culturally diverse population, and many recent immigrants have opened "mom-and-pop" shops primarily in the food services and produce sectors. The people here are good workers who would welcome new opportunities for employment and retraining.

The Chamber of Commerce has been actively pursuing new, clean industries and has been negotiating several tax and utilities incentives with Babco if they would build their new facility in Grimesville. The *Grimesville Gabber*, the local newspaper, has strongly supported the Babco project in its recent editorials. Several environmental activist groups, however, are strongly opposed to the new plant. They clearly remember many of the environmental problems with air and water pollution that were associated with the old plating shops in town, and they don't want this to happen again. They will continue to oppose

the plant until their questions are answered satisfactorily.

Issues and Challenges:

Financial:

Babco has estimated that it will require \$38.6 million to construct and equip the new plant. As a small company with limited assets, they will need to borrow almost all of this in order to complete the project. They are negotiating with several venture capitalists and banks, but are faced with the undesirable prospect of having to trade more than half their equity in order to secure the necessary funding. Babco has also approached USABC for funding, but during the preliminary discussions they learned that USABC would have exclusive rights to any future patents that might result from the partnership. Babco is opposed to this, however, because of their strong patent position with respect to lithium-polymer battery technology, and they don't want to compromise their leadership advantage in this emerging market. They are still negotiating with USABC, but will probably seek other sources of funding if they can't obtain a better deal on future patents.

Gary Motors Corporation (GMC) has taken a strong interest in Babco's batteries, and is considering a joint venture.

Technology:

Babco has developed a new lithium-polymer electric battery as well as a non-polluting process for manufacturing the battery for electric vehicles. They feel that this battery will enable them to gain early entry into an emerging industry. The battery has been designed for either a cylindrical (preferred by Babco) or a flat plate prismatic configuration. The anode is constructed of a high-surface-area (proprietary) lithium-carbon composite and the cathode is made of vanadium oxide. The electrolyte consists of a polyethylene oxide containing a dissolved organolithium

salt. Babco holds patents on both the composition as well as the physical construction of the new *Nirvana* battery. Although the basic process for manufacturing these cells makes use of similar raw materials as competing processes, Babco has incorporated design-for-environment principles that will minimize the production of hazardous waste and will optimize the use of raw materials, water, and byproducts. One technical issue that must be solved quickly involves the application of thin film technology for the fabrication of the polymer oxide. Babco has approached Jefferson National Laboratory for technical assistance, but a potential problem exists because Jefferson is a participant in USABC and Babco is not! Jefferson and Babco are currently exploring the possibility of a separate CRADA (Cooperative Research and Development Agreement), but it is not clear whether this will be allowed under the existing USABC program constraints.

In the new Babco process, nonhazardous byproducts will be recycled back into the front-end of the production process. Hazardous byproducts will be sold to Sludgeco Industries, located 75 miles south of the Grimesville plant, but Restore, Inc. has also indicated an interest in handling Babco's waste. Nonhazardous solid wastes will be sent to a new Plasma Hearth facility for incineration. A particularly attractive feature of the new manufacturing plant is the use of a closed-loop recycling process that will capture over 95% of all metals and metal salts, and will return them to the incoming raw materials stream. The remaining metal sludge will be vitrified and sent to an offsite facility for disposal. In addition to metal recycle and reuse, the application of advanced water treatment technologies (e.g., ion exchange and reverse osmosis) will insure that there will be zero discharge of pollutants into the water. The plant has been designed to reduce

emissions to well below all current federal, state, and local environmental requirements.

Another benefit to be offered by Babco is takeback of the "used" batteries at the end of their useful life. The batteries have been designed so they can be easily disassembled and reused. The owner will be able to return the batteries to special takeback facilities and will receive a new battery or will receive a credit for the purchase of a new battery in the future. In addition, the electric vehicle dismantlers will now have a new market for the batteries when they dismantle the cars. Babco wants to become a leader in the development of new methodologies that will seamlessly integrate design-for-recyclability and design-for-reuse into all of their current and future manufacturing processes.

Permitting:

Babco officials are also confused by the permitting process in California. No government agency seems to have final approval authority. Furthermore, approval by one local or regional board does not seem to grant approval even for neighboring counties and regions. Babco also believes that meeting all current regulations would not protect them from new and more onerous environmental restrictions in the future. They would like to work with government agencies to develop one-stop shopping for permitting that would be accepted throughout the state, and to create some stability with respect to future obligations.

Siting:

The plant will be located near the southwest corner of Grimesville. Babco has designed the facility as a zero-emissions factory, so that people can live close to the place where they work. This will minimize the need for a long commute, and will also result in energy savings as well as reduced air emissions from conventional vehicles. Babco also intends to encourage van pools by making electric

vehicles available to their employees. Babco is firmly committed to the *greenspace* concept, where communities can work and play in close proximity. They are also considering building a golf course close to the plant.

Environmental Impact:

Several environmental activist groups in Grimesville are strongly opposed to the plant. In particular, Citizens Against Suspicious Technologies (CAST) has said that they don't understand Babco's zero-discharge technology, and would like company engineers to demonstrate the feasibility of their proposed closed-loop water recycling process. The environmentalists are also concerned about potential manufacturing scale-up problems. They feel that the pilot process facility in Novato has not provided sufficient data to warrant scale-up to a production facility. Finally, these groups are concerned about Babco's *green-factory-of-the-future* concept, and are not convinced that the manufacturing facility can be safely operated so close to the communities where the factory workers live. An unidentified member of the Rockies Club has reported that a Babco worker saw acid leaks during a test of the manufacturing process. The company dismisses this as completely untrue.

Timing:

Negotiations have been ongoing for more than six months on the necessary permits for the plant. One of the problems is that the regulators are not yet convinced that Babco will be able to implement a total closed-loop water recycle system, without any discharge of effluents to the environment. Babco is becoming impatient with the numerous rounds of negotiations and with the environmental activists in Grimesville, and they are seriously considering relocating their plant in Mexico. Discussions are currently underway with government officials in Mexico City to locate a site along the border and to construct a

Maquiladora facility with financing from the World Bank.

Foreign Involvement:

Babco intends to sell its technologies to interested companies not only in the US, but also in Japan, Mexico, and several European countries. Mexico is especially interested in clean electric vehicles because of their critical air pollution problems in Mexico City. Germany is interested because this provides an extremely good fit with their emerging infrastructure, which supports green manufacturing and product takeback. These countries have also expressed an interest in building environmentally conscious manufacturing facilities. They have suggested that the World Bank might provide funding. Babco senior management has stated that if they are unable to gain US financing or if they continue to encounter problems with environmentalists and state regulators, then they will definitely approach Mexico, and possibly also Germany and Japan.

Consolidated Financial Statements
Babco, Inc.

Income Statement
[**\$ in millions**]
for the year ended Dec 31, 1994

Operating Revenues from Sales	\$75
Operating Expenses	\$70
Salaries	25
Benefits	8
Selling Expense	30
Administrative	7
Net Income from Operations	\$ 5
Income Taxes	1
Net Income After Taxes	\$ 4

Balance Sheet
[**\$ in millions**]
as of Dec 31, 1994

Current Assets	\$ 60
Cash	2
Receivables	7
Property, Plant, Equip	35
Intangibles [Lith/Pol & Reuse Technologies]	9
Inventories	7
Current Liabilities	\$ 6
Accounts Payable	3
Notes Payable	2
Accrued Taxes Payable	1
Stockholder's Equity	\$ 54

Statement of Cash Position
[**\$ in millions**]
for the year ended Dec 31, 1994

Sources of Cash	
Net Income	\$ 4
Effects of changes in Operating Capital:	
Increase in Accts Receivable	(2)
Decrease in Inventories	3
Increase in Accts Payable	1
Issuance of Common Stock-Additional Shares	0
Total Sources of Cash	\$ 6
Uses of Cash	
Dividends Declared and Paid	\$ 6
Change in Cash Position	\$ 0
Cash, Dec 31, 1993	\$ 2
Cash, Dec 31, 1994	\$ 2

Stock Position: 10 Million Shares outstanding	Market Value \$5.60/share	Book Value \$5.40/share
Dividends: \$0.60/share	P/E Multiple: 9	

Blue Team 3 - ROCAR

Company Structure, History, and Products:

Big Oil, Inc. has formed a joint venture with Clohi, Inc. to form an ad hoc virtual company called ROCAR (Remove Organic Compounds At Refineries). Big Oil has been threatened with a shutdown of its three California refineries unless it takes action on reducing the emissions of volatile organic compounds (VOCs). In particular, the Manuel Air Quality Management District, the San Manuel County Environmental Health Agency, and the California Department of Toxic Substances Control have all threatened Big Oil with forced closure within five years unless the company achieves compliance; the company may also face fines of \$50,000 per day. (Big Oil internal private memos have expressed complete disgust with the current environmental regulatory burden in the State of California. Even if they manage to surmount the regulatory hurdles, they are afraid that environmentalist groups will continue to tie them up in court for more than five years. Senior management has vowed to never build a plant in the state again. Corporate high-level discussions have also seriously addressed the voluntary shutdown of the San Manuel plant, and the construction of a modern refinery in Korea.)

Clohi is a small company that has developed a thermal oxidation "hot rocks" process used to destroy toxic organic wastes in air streams. Gaseous emissions are limited to CO₂, water vapor, and less than 2 ppm NO_x. NO_x are not produced in the process; HCl and SO₂ are scrubbed where present. Clohi claims a destruction of VOCs by 99.99% - a reduction factor of 10,000 to one. Although Clohi is working closely with Big Oil on refinery leakages, they are also interested in commercializing their technology in many other areas including decontaminating soils

and groundwater, and air pollution control. They are actively seeking other customers concerned with pollution prevention, environmental restoration and waste management.

Scenario:

Big Oil has proposed to regulatory agencies (and publicized in the press) the installation of Clohi units on Big Oil's refinery in San Manuel. They would also like to employ this technology at their two other refineries in central and southern California without having to seek approval of another multitude of different regulatory agencies.

Some citizens have hailed this new technology as a major step in improving air quality. They argue that current VOC emissions from the refinery are a contributor to a higher-than-average incidence of prostate and breast cancers in the area. The environmental group CAST (Citizens Against Suspicious Technologies) agrees with ROCAR's motivation, but is concerned that the technology has been oversold. They have stated that the Clohi process is not nearly as efficient as claimed; furthermore, they are concerned that new toxic organic compounds could be generated by the high temperature process. Some even maintain that the Clohi system is a thinly disguised incinerator that is not much better than current incinerators; one group claims that there is evidence that the incidence of lung cancer is higher in the neighborhood of incinerators that operate at similar temperatures.

The biggest stumbling block at present is the requirement to gain approval from 14 different regulatory agencies. Although most of those agencies have given their tentative approval, three agencies are currently considering ROCAR's request. The Manuel Air Quality Management District, the San Manuel County

Environmental Health Agency, and Cal EPA Department of Toxic Substance Control (DTSC) have promised ROCAR that they will deliver their final remaining requirements by the end of 1995. ROCAR will then have to demonstrate to the agencies' satisfaction that these requirements can and will be met.

Clohi very much wants the ROCAR joint venture to succeed. They believe that they will produce large-scale evidence that the system works as claimed and is more economical than competitive systems. They also believe that a successful demonstration will allow them to market their device in other states and other countries. They are working with Big Oil to seek legislation that will allow them to market this device at the two other Big Oil refineries in California without having to endure the regulatory process two more times with different agencies.

Issues and Challenges:

Financial:

Big Oil has set aside \$10M to assist the success of the ROCAR joint venture for its three California plants and for its other refineries around the world. They believe that this new technology will be much cheaper and more dependable than the best available control technology (BACT). However, corporate executives are reluctant to invest more than this until they see significant progress. Big Oil has encouraged Clohi to seek other customers, and has agreed to consider expanding the joint venture — if they are convinced that it would be in the interests of the Big Oil stockholders and employees.

Clohi has exhausted all its available capital. However, they are actively seeking additional government (DOE, DoD, municipalities) and private customers, as well as additional financing for building an environmentally-conscious manufacturing

facility that would produce ready-made units for other industrial applications including automobile exhaust systems that would convert CO to CO₂, and perform similar functions in fireplace chimneys. They would also like to build a new research facility to expand the applications of Clohi systems, and to partner with national labs and universities on supporting research. They believe their technology can be expanded to convert soot and other carbonaceous solids to CO₂, as well as reducing auto exhaust emissions. Clohi has requested a letter of intent from Big Oil to help them secure additional private financing.

Technology:

Clohi is an exothermic oxidation process. The unit is preheated to approximately 1600°F by a natural gas flame or electric heater. Once the unit is heated, the waste stream is introduced into the mixing area of the unit where it is thoroughly mixed to ensure maximum destruction of VOCs. The heat produced in the process allows the system to operate continuously, without any further addition of energy. Clohi holds five patents on this technology: 1) the exothermic process for heat recovery developed at Jefferson National Laboratory; 2) the process used to thoroughly mix the waste stream; 3) the shape and nature of the hot rocks mixing chamber to ensure destruction; 4) the hardware and configuration of an upstream concentrator for low-concentration streams; 5) the hardware and configuration of the thermal unit. However, a strong rumor is circulating that John D. Control, a lawyer for a competing company, Litigious, Inc., is contesting three of those patents.

Theoretically, Clohi could treat VOCs ranging from vapors to liquid streams, as well as solids. Long term survivability of the refractory used in the mixing chamber is a concern to Clohi. To match up well with Big Oil's refinery operations, the unit needs to be

more automated for long-term, unattended operations. This would require Clohi to install high-temperature sensors and conduct more detailed modeling than they were able to do in their development process. In addition, although all of Clohi's off-gas system testing has shown that they meet environmental specifications, Big Oil is concerned about the possibility that gas recombination in the off-gas system could produce other toxic species (based on statistical recombination).

Clohi will soon begin negotiations with universities and national labs to expand their technology and develop new applications in any industry where air emissions pose a hazard. Individual Clohi units are employed at pumps, valves, flanges, wherever VOCs usually escape into the atmosphere.

Permitting:

ROCAR is working hard both to satisfy existing permitting regulations, as well as to change those regulations in the future. They are also concerned that having invested heavily in this technology, future regulations might become even more restrictive, forcing them to begin again. ROCAR is considering working together with other companies, the state legislature, and potential customers to create more stability and a stronger scientific basis in environmental regulation. ROCAR has already hired a legal team that is researching the filing of an injunction to force the regulatory agencies to specify the scientific basis for their requirements, and to agree to keep them unchanged for a period of twenty years.

Certification:

Clohi is actively seeking certification from the California Department of Toxic Substances Control (DTSC). Certification would be very beneficial to further marketing of their technology in other states and countries. However, a current roadblock is that all

thermal processes, including Clohi, have been classified as "incinerators" or "other." The California legislature has decreed that the certification process shall not be used for hazardous waste incineration technologies. Clohi and Big Oil are trying to lobby the legislature for a change in the law. (Clohi has also considered skirting the law by introducing an inert catalyst and redefining the process as "catalytic conversion.") ROCAR is also trying to convince state and federal regulators to create new categories for certifying advanced technologies, rather than trying to force these technologies into 25-year-old categories. The USEPA is also looking closely at the Clohi process and regulatory implications for its new Technology Innovation Initiative.

Siting:

The San Manuel County Board of Supervisors has agreed in principle for ROCAR to install the Clohi process on their refinery. They are adamantly opposed to the closing of the refinery and the resulting loss of 1400 jobs in the community. However, they have stated that the permitting would be conditional on the process being proven in the field. They want ROCAR to contractually agree to remove the system and replace it if air quality is detrimentally affected by the system. ROCAR has balked at this imposition.

Environmental Impact:

ROCAR argues that they have been placed in an untenable Catch-22 position. If they do nothing about the refinery's current emissions, they may be forced to suspend operations permanently. However, they are being forced to prove a new technology that might still have undiscovered problems. They argue that the system will be better than the status quo, but that they should not be required to invest millions to demonstrate this before the installation begins. Environmentalists are concerned that the system may not be an

improvement over the status quo. They want independent verification of Clohi's process from disinterested parties such as national labs, universities, or private testing agencies. They also are concerned about global warming as a result of CO₂ releases. They have requested the state to support research at the labs and universities on processes that will result in **zero** emissions.

Big Oil has begun negotiations on the construction of a refinery in Korea.

If Clohi was sited at the refinery, some environmentalist groups fear that it might also be used to "treat" refinery wastes other than just VOCs. Treating those other wastes might produce a glass slag that could be toxic and might end up in the San Manuel landfill.

CAST has examined the Clohi process and is concerned about its fourth step: Could the concentrator create highly volatile solutions from the less volatile ones, with potential toxic or explosive mixtures? What if the system should fail or leak at this point?

Timing:

Regulatory agencies have said that Big Oil must eliminate its VOC emissions by December 1, 2000. However, they did not specify the target reductions. Big Oil is concerned that these targets may be unrealistically low. Even if the emission targets are reasonable, they are still worried that the targets will be lowered in the future. ROCAR is trying to negotiate realistic dates and emissions levels with the regulatory agencies.

Foreign Involvement:

Clohi is motivated to expand their market both nationally and internationally. They have been discussing applications in both Eastern and Western Europe, and in Mexico. Foreign governments have expressed interest, but only if the US government (Federal and State) has certified the technology to their satisfaction.

Consolidated Financial Statements
Big Oil, Inc.

Income Statement
[\$ in millions]
for the year ended Dec 31, 1994

Operating Revenues from Sales	\$3,480
Operating Expenses	\$ 2420
Salaries	910
Benefits	150
Selling Expense	1120
Administrative	240
Net Income from Operations	\$1060
Income Taxes	100
Net Income After Taxes	\$960

Balance Sheet
[\$ in millions]
as of Dec 31, 1994

Current Assets	\$15,345
Cash	400
Receivables	45
Property, Plant, Equip	890
Intangibles [In-Ground Reserves]	14,000
ROCAR Joint Venture	10
Current Liabilities	\$ 617
Accounts Payable	85
Notes Payable	517
Accrued Taxes Payable	15
Stockholder's Equity	\$14,728

Statement of Cash Position
[\$ in millions]
for the year ended Dec 31, 1994

Sources of Cash	
Net Income	\$960
Effects of changes in Operating Capital:	
Decrease in Accts Receivable	10
Decrease in Reserves	14
Increase in ROCAR Joint Venture	(10)
Issuance of Common Stock-Additional Shares	0
Total Sources of Cash	\$974
Uses of Cash	
Dividends Declared and Paid	\$960
Change in Cash Position	\$ 14
Cash, Dec 31, 1993	\$386
Cash, Dec 31, 1994	\$400

Stock Position: 500 Million Shares outstanding	Market Value \$34.88/share	Book Value \$29.46/share
Dividends: \$1.92/share	P/E Multiple: 18	

Consolidated Financial Statements

Clohi, Inc.

Income Statement
[\$ in millions]
for the year ended Dec 31, 1994

Operating Revenues from Sales	\$1
Operating Expenses	\$2
Salaries	1
Benefits	0
Selling Expense	1
Administrative	0
Net Income from Operations	(\$1)
Income Taxes	0
Net Income After Taxes	(\$1)

Balance Sheet
[\$ in millions]
as of Dec 31, 1994

Current Assets	\$32
Cash	0
Receivables	0
Property, Plant, Equip	1
Intangibles [Closed Loop Hearth Patents]	30
Inventories	1
Current Liabilities	\$2
Accounts Payable	0
Notes Payable	2
Accrued Taxes Payable	0
Stockholder's Equity	\$30

Statement of Cash Position
[\$ in millions]
for the year ended Dec 31, 1994

Sources of Cash	
Net Income	(\$1)
Effects of changes in Operating Capital:	
Decrease in Accts Receivable	0
Decrease in Inventories	1
Increase in Accts Payable	0
Issuance of Common Stock-Additional Shares	0
Total Sources of Cash	\$0
Uses of Cash	
Dividends Declared and Paid	\$0
Change in Cash Position	\$0
Cash, Dec 31, 1993	\$0
Cash, Dec 31, 1994	\$0

Stock Position: 13 Million Shares outstanding	Market Value \$2.30/share	Book Value \$2.30/share
Dividends: \$0.00/share	P/E Multiple: Infinite	

Blue Team 4 - CUTS

Company Structure, History, and Products:

Behemoth Engine Company and Electra Technologies (ET) have formed a partnership called CUTS (Clean Up The Soil) to solve an urgent problem in environmental restoration faced by Behemoth.

Behemoth is a publicly-owned diesel engine R&D, design, manufacturing and service company with plants throughout the US and Canada. Beginning in the 1950s, Behemoth operated a foundry in Grimesville, California, but closed it down in 1993. For forty years, Behemoth cleaned and degreased engines and engine parts at the abandoned foundry, pouring TCE and other solvents, diesel fuel and foundry sand on the ground at the Grimesville site. An old underground gasoline tank has leaked into the surrounding soil. The ground and aquifer are contaminated with benzene, toluene, xylene, and TCEs. The 150-acre site consists of the abandoned foundry, the office complex, parking lot, a transportation area, and four vacant lots.

Regulators and environmentalists have been pressuring Behemoth to clean up the abandoned site. Behemoth has been notified that "principal responsible parties" can be fined if pollution is found to be detrimentally affecting the water supply or public health, although no action has yet been taken. Behemoth is also strongly motivated by a possible sale of the property to a land developer for a new housing development; the sale is contingent on a rapid decontamination of the site. The company, which has five sites that are similarly contaminated, wants to remove these multimillion dollar liabilities from its books.

Almost all of Behemoth's new-engine business has been shifted to Asian and European manufacturers. In Grimesville,

Behemoth has changed its focus to the lucrative aftermarket service business. The company downsized from 1100 employees while located at the abandoned foundry to 65, all now housed in a small nearby business park.

Electra Technologies is a small, developing company that currently employs 23 people (scientists, secretaries, managers, marketers, sales people and engineers). Since different VOCs travel differently through soils, Electra's system contains options for treatment. ET has developed a "toolbox" for cleaning up contamination due to volatile- and semi-volatile organic compounds (VOCs and SVOCs) in soil and water. Electra believes that by using their new electron beam technology for destroying VOCs and SVOCs, they can clean up the Behemoth Grimesville site in two years for a third of the cost of traditional methods. Electra subcontracts much of the toolbox technologies and operations, but the electron beam is its own proprietary technology.

Behemoth has investigated conventional clean-up technologies that will remove the VOCs in five to seven years at an estimated cost of \$30 per pound of VOC. Electra claims they can do the restoration in two years for approximately \$8 per pound of VOCs destroyed. Behemoth has formed a partnership with Electra to gain regulatory approval and public buy-in to this cheaper new technology. However, Behemoth is concerned that the permitting process and potential litigation may delay the cleanup for five years, or even indefinitely.

Scenario:

Urban Sprawl Development Corporation has been negotiating with Behemoth to buy the 150-acre site and build a residential development called Phoenix. Housing would be provided for 600 families, with 35% of the

land set aside for a sports complex which includes soccer fields, baseball diamonds and picnic areas. Phoenix will include high-density town homes, as well as single-family detached homes, at prices ranging from \$190,000 to \$400,000. The land has easy access to freeways, and nearby shopping, schools and rapid transit.

Grimesville is a community of 75,000 people located south of Oakland. It is an economically depressed community, which has experienced a steady decline in jobs as a result of a loss of its manufacturing base and has had trouble attracting new industries because of contamination of existing land and facilities. Many of its plants have closed, and there has been a steady exodus of young people due to a lack of jobs. The current unemployment rate is more than 15%. Grimesville has been attempting to attract new industries with moderate success. It would also like to clean up all the contaminated sites of the abandoned plants. Grimesville favors the purchase of the abandoned Behemoth site by Urban Sprawl. The construction and maintenance of a new housing development would supply many new jobs to the area and help to rebuild the weakened tax base. However, the city is not especially interested in Electra's new technology, and would prefer that Behemoth use conventional clean-up technology, regardless of the higher costs. The city agrees that litigation and regulatory problems would probably more than offset the shorter estimated decontamination time using ET's technology. However, Grimesville is open to the CUTS partnership concept, and would support it if the regulators and community citizens agreed.

Issues and Challenges:

Financial:

Behemoth has invested \$250,000 in Electra over the past year. Behemoth's stock price is hovering near an all-time low of \$4 per share,

due in large part to having the five polluted properties appear on its books. The CEO and top company officers fear an unfriendly takeover of the company if the stock price is not relieved by the sale. This pressure is a primary motivator for Behemoth's interest in the ET technology which will expedite the decontamination and subsequent sale. However, Behemoth also faces the possibility of fines of \$50,000 per day from the Regional Water Quality Board unless remediation of the water is completed in five years.

Electra's technology looks very good, but there are severe obstacles. Potential litigation could drain Behemoth's cash reserve, which is currently very low. Convincing the regulators to approve the technology is another major obstacle. Behemoth is willing to invest more, if they can be convinced that they will recoup their investment based on lower costs of remediation and a shorter time frame.

Electra believes its technology is ready for testing. They are seeking letters of intent from other customers like Galaxy Business Machines, Choco Chips Semiconductors, and Awesome Aerospace. They are also seeking lab and university help in the planning and development of new applications. Additional financing is being sought to expand the technology into the following areas: mixed waste remediation in the drum; conversion of SO₂ and NO_x in exhausts from coal-burning plants to reduce acid rain; food irradiation; medical sterilization; and rapid curing of plastics.

Depending on requirements, Behemoth may have to employ BAD bacteria at greatly increased costs. They believe that either technology (Best Available Control Technology (BACT) or Electra) will clean the soil adequately (to a few parts per billion), but they are worried about more stringent regulations in the future.

Technology:

The main contaminants on site are TCEs from degreasers and solvents, which have sunk into the aquifer, and benzene, toluene, ethylene, and xylene from gasoline and diesel fuel, which have spread out and migrated in more horizontal paths. There is some question whether the 5-acre staging site for degreasing engines and parts can be completely remediated by the time construction is scheduled to begin in two years. Urban Sprawl is asking its designers to locate the shopping center parking lot on the worst part of the site. CUTS believes that Electra's technology will be adequate. However, as a backup, bioremediation with Restore's patented biologically accelerated decomposition (BAD) bugs should eventually break down all the TCEs under the blacktop surface.

Additional soil contamination was found on the half acre surrounding the underground gasoline storage site, and areas near the foundry. Electra plans on bringing VOCs and

SVOCs to the surface through soil vapor extraction or thermal extraction, and treating the air stream with the electron beam to destroy the compounds. Electra's beam works at low pressures and generates very little heat. It requires less energy than many other methods, and produces only minor out gassing.

The groundwater is severely contaminated with TCEs. Electra claims its beam technology excels at remediating pollution in water. It can treat groundwater at a rate of 1800 gal. per minute. Approximately 1000 acre-feet of water will be pumped through the beam's unit and remediated.

If necessary, Electra will also plant BAD bugs in all contaminated areas after treatment with the beam to ensure thorough and continuing destruction.

CUTS has estimated the Grimesville site cleanup costs as follows:

		Electra	BACT	BAD (1 m deep)
Staging Site (25,000 lbs TCE/acre)	5 acres, 2 meters deep	\$1.0M	\$3.8M	(\$2.3M)
Gas Tank Site (5.8x10 ⁻⁴ lbs VOC/lb soil)	0.5 acres, 6 meters deep	\$0.3M	\$1.0M	(\$0.5M)
Additional low-level sites (5.8x10 ⁻⁵ lbs VOC/lb soil)	20 acres, 2 meters deep	\$0.3M	\$1.3M	(\$2.2M)
Aquifer	1000 acre-ft	\$1.1M	\$1.2M	
TOTALS		\$2.7M	\$7.3M	(\$5.0M)

Electra has filed four patent applications covering the process of using electron beams for the treatment of toxics, various hardware components and configurations. Two have been granted and two are pending.

Permitting:

The Air Management District is skeptical about Electra's technology. The chief permit engineer has requested a large amount of data to prove the technology works. He would

prefer the job be done with the best available control technology (BACT). CUTS is currently lobbying both federal and state legislators, as well as the EPA, to implement both risk assessment procedures and performance-based criteria for permitting and using new technologies.

The president of Behemoth has often said that his customers ask him for a 7 Megawatt engine/generator set. They judge the equipment on its performance and reliability. They don't tell him how to build the engines and generators!

Siting:

Urban Sprawl very much favors the Behemoth site. They believe that successfully reclaiming this property will open the door to many other parcels of contaminated land that could be profitably developed. However, they will not wait forever for the Behemoth deal to be completed, and are exploring other sites and other communities. Some Grimesville citizens' groups have been actively lobbying Urban Sprawl to build in their neighborhoods. The mayor of Grimesville has been insisting that Urban Sprawl set aside 20% of the site for low-income housing, but Urban Sprawl is adamantly opposed to this.

Environmental Impact:

Some environmental groups want strong guarantees that the developed land will not become another Love Canal. They want assurances, preferably by trustworthy independent parties, that the reclaimed land will be habitable; they are not very concerned about which technology should be employed, nor about Behemoth's financial condition. Certain community activists are worried about the electron beam technology, and the by-product VOC emissions from Electra's process. They believe that the health of current neighbors of the Behemoth site could be impacted by this "dangerous" technology.

Other groups favor cleaning up the site, but are opposed to the housing development. They want to see the land set aside as a green belt, and are afraid that a housing development would increase auto traffic on their streets.

Timing:

Regulatory agencies have said that Behemoth must clean up its site by December 1, 2000, or face heavy fines. However, the agencies did not specify the target reductions. Behemoth, like Big Oil Inc., is concerned that these target reductions may be unrealistically low. Behemoth is also involved in a Catch-22 situation. Conventional technologies would require six years for remediation; that means they could not meet the deadline. Electra's toolbox would probably work, if they can gain the permits they need quickly, and avoid extended litigation.

Foreign Involvement:

Electra is seeking other customers, both nationally and internationally. They would like to participate in an international consortium for environmental restoration, and are looking for additional partners and financing.

Consolidated Financial Statements
Behemoth ENGINE COMPANY, Inc.

Income Statement
[\$ in millions]
for the year ended Dec 31, 1994

Operating Revenues from Sales	\$12
Operating Expenses	\$11
Salaries	3
Benefits	1
Selling Expense	5
Administrative	2
Net Income from Operations	\$1
Income Taxes	0
Net Income After Taxes	\$1

Balance Sheet
[\$ in millions]
as of Dec 31, 1994

Current Assets	\$115
Cash	2
Receivables	3
Property, Plant, Equip	90
Intangibles [Engine Patents]	12
Inventories	8
Current Liabilities	\$ 55
Accounts Payable	0
Notes Payable	5
Accrued Taxes Payable	0
Grimesville Foundry Clean-Up	50
Stockholder's Equity	\$60

Statement of Cash Position
[\$ in millions]
for the year ended Dec 31, 1994

Sources of Cash	
Net Income	\$1
Effects of changes in Operating Capital:	
Decrease in Accts Receivable	0
Decrease in Inventories	4
Increase in Accts Payable	0
Issuance of Common Stock-Additional Shares	0
Total Sources of Cash	\$ 5
Uses of Cash	
Dividends Declared and Paid	\$6
Change in Cash Position	(\$1)
Cash, Dec 31, 1993	\$3
Cash, Dec 31, 1994	\$2

Stock Position: 15 Million Shares outstanding Market Value \$4.00/share Book Value \$4.00/share
 Dividends: \$0.40/share P/E Multiple: 10

Consolidated Financial Statements
ELECTRA TECHNOLOGIES, Inc.

Income Statement
[\$ in millions]
for the year ended Dec 31, 1994

Operating Revenues from Sales	\$5
Operating Expenses	\$6
Salaries	2
Benefits	1
Selling Expense	2
Administrative	1
Net Income from Operations	(\$1)
Income Taxes	0
Net Income After Taxes	(\$1)

Balance Sheet
[\$ in millions]
as of Dec 31, 1994

Current Assets	\$25
Cash	1
Receivables	0
Property, Plant, Equip	3
Intangibles [Electron Beam Technology]	20
Inventories	1
Current Liabilities	\$ 7
Accounts Payable	0
Notes Payable	7
Accrued Taxes Payable	0
Stockholder's Equity	\$18

Statement of Cash Position
[\$ in millions]
for the year ended Dec 31, 1994

Sources of Cash	
Net Income	(\$ 1)
Effects of changes in Operating Capital:	
Decrease in Accts Receivable	1
Increase in Inventories	(1)
Increase in Accts Payable	0
Issuance of Common Stock-Additional Shares	1
Total Sources of Cash	\$ 0
Uses of Cash	
Dividends Declared and Paid	\$0
Change in Cash Position	\$0
Cash, Dec 31, 1993	\$1
Cash, Dec 31, 1994	\$1

Stock Position: 9 Million Shares outstanding	Market Value \$2.00/share	Book Value \$2.00/share
Dividends: \$0.00/share	P/E Multiple: Infinite	

Suggested Examples For Green Team Requirements

For Restore, Inc.

- Your cost estimates seem very low. What assurances can you provide that costs won't escalate as soon as a contract with the county is signed?
- Initial capital costs are only part of the story. Prove that your operating costs will not be higher than current landfills.
- Recycling has never been profitable. Prove that your recycling concepts will actually reduce the costs to the citizens for solid-waste disposal. What new technologies will be used to separate paper, plastics, glass, ferrous and nonferrous metals, putrescibles, etc.? Who are your customers for these recyclables?
- Could your facility be modified to also treat sewage sludge? I hear that your competitors are developing a complete municipal waste system.
- The San Manuel Turkee River site is ridiculous. Besides incurring obvious environmental damage, you could not build the landfill below ground because of tides and high groundwater levels. Building above ground will block views and depress land values. Defend your selection of the estuary site over the much preferable site on the south side of town, or present a new proposal for the south-side site.
- We applaud Restore's recognition of environmental justice, and their proposal to build the plant in neighborhoods other than ours (viz. the south side). However, we need indisputable proof that the salmon migration will not be damaged.
- How many jobs will Restore actually provide? Will these be given to residents or to outsiders?
- What will Restore contribute to the tax base? Will tax breaks eliminate all benefits to

the city and county?

- It is unusual to go from small-scale to a full demonstration facility. Prove (with computer models and/or testing) that you can safely skip the pilot-plant phase.
- Can you demonstrate that your plant will meet all federal and state environmental laws and regulations from cradle to grave?
- Have you prepared an Environmental Impact Statement? Will your facility meet future regulations as well as current ones?
- Provide more data on your liner system. Convince us of its reliability. Does it exceed current RCRA requirements for municipal landfills?
- How will a strong earthquake affect your facility?
- How will you deal with extended rainstorms and flooding during the construction and operation phases of your landfill?
- What about the existing contamination on the military base? Who will clean that up and who will pay? We even heard that unexploded ordnance exists on the base!
- Who will be liable for future environmental damage? Will you establish an escrow account to pay for future problems? How much? What guarantees will you provide that this won't become another Love Canal?
- Were the bacteria genetically engineered? What guarantee do we have that these bacteria won't cause diseases?

For Babco:

- Will the promised jobs be given to residents or to outsiders? Are these high-paying jobs?
- We're tired of technical snow jobs and unintelligible jargon. We want to know in plain English what all the risks are for your new plant.
- How will a strong earthquake affect your facility?

- How will you deal with extended rainstorms and flooding during the construction and operation phases of your facility?
- What proof do you have that *Nirvana* can achieve the 200+ mile range that is coveted by the electric auto industry, at reasonable cost and with high reliability?
- What are the differences between the cylindrical and flat plate prismatic configurations for the battery, and why do you favor the cylindrical design? Is the manufacture of one safer than for the other? What about operation? What about safety when I'm under the hood of my car...is this thing going to blow up in my face?
- With all of your so-called advanced concepts in manufacturing, won't the battery cost so much that no one will buy it? This will result in shut-down of the factory and another dinosaur factory near our neighborhoods.
- Your recycling process is new and unique. Prove that it really works! Small-scale laboratory tests are not necessarily valid, and we don't believe your computer models. You can make your computer say anything you want. Provide independent verification of your process.
- What does "zero emissions" really mean? Are you trying to pull the wool over our eyes?
- Prove that there will be zero discharge of pollutants into the water.
- You claim zero discharge into the water, yet you then back off and say that the plant emissions are below current requirements. Why the double talk? What exactly are your emissions, how much and in what form?
- Meeting current emission standards is not enough! There is new legislation pending that is more strict than the current standards. You must meet the pending legislation and any conceivable future legislation as well.
- Why would Sludgeco buy your hazardous materials? Wouldn't they charge you to

handle them for you? What are you hiding from us?

- What exactly is this "polyethylene oxide/dissolved organolithium salt electrolyte," and is it going to leak all over and contaminate things here and all over the country?
- Why is the thin film application to fabrication of the polymer oxide so important to your process, and what happens if you can't perfect it? What are the safety issues?
- You have an undisclosed acid leakage problem. What other undisclosed problems do you have? We will require a full environmental impact assessment report to be done before you can build this plant. The EIA must be done by an environmental specialist of our choosing, and you must pay for it.
- What monitoring equipment will be used for checking air and water emissions? What will Babco's liability be if they exceed their expected emissions levels?

For ROCAR:

- We've never seen a demonstration or verification of your technology. Prove that the reduction in VOCs is really 10,000:1 as you claim.
- Show that the system can operate automatically for long periods of time in an unattended mode without going out of environmental specs.
- What kind of throughput will be required to destroy VOCs at escape points? Can your system really handle that volume?
- Could the concentrator create highly volatile solutions from the less volatile ones, with potential toxic or explosive mixtures? What if the system should fail or leak at this point? Prove safety and zero environmental impact as a result of system failures.
- There has been an increasingly sulfurous tinge to the sea breeze over the past years, which indicates that your sulfur problem is just as bad as the VOC problem. Upgrade

your scrubbers to reduce your sulfur emissions by a factor of 10.

- What is happening to the chlorides in the VOCs that you burn? Are they coming out as toxic chlorine gas? Maybe that's why everyone near an incinerator gets cancer.
- Prove that you aren't generating any harmful compounds in your process. A small experiment won't convince me since it's a whole lot different than a refinery stack.
- That high-temperature process of yours will kill some of us. It's giving off some sort of energy or radiation or something that isn't natural.
- Show that the off-gas system sludge/waste streams are non-toxic or can be added back into Clohi for processing.
- Don't raise my gas prices because of this new thing. It's your fault that you aren't cleaning it up well enough right now, so don't pass the cost on to me.
- Make your system good enough that it will meet all future regulations as well as current ones. Agree to close the refinery if it doesn't.
- This is nothing more than an incinerator, and it will spread ash all over our community. Prove that the Clohi process is not an incinerator or shut down the refinery.
- Make your system emissionless.
- If this is going to make CO₂, you're going to increase global warming. Find another way.
- What are the potential consequences of the worst possible accident in lives and dollars?

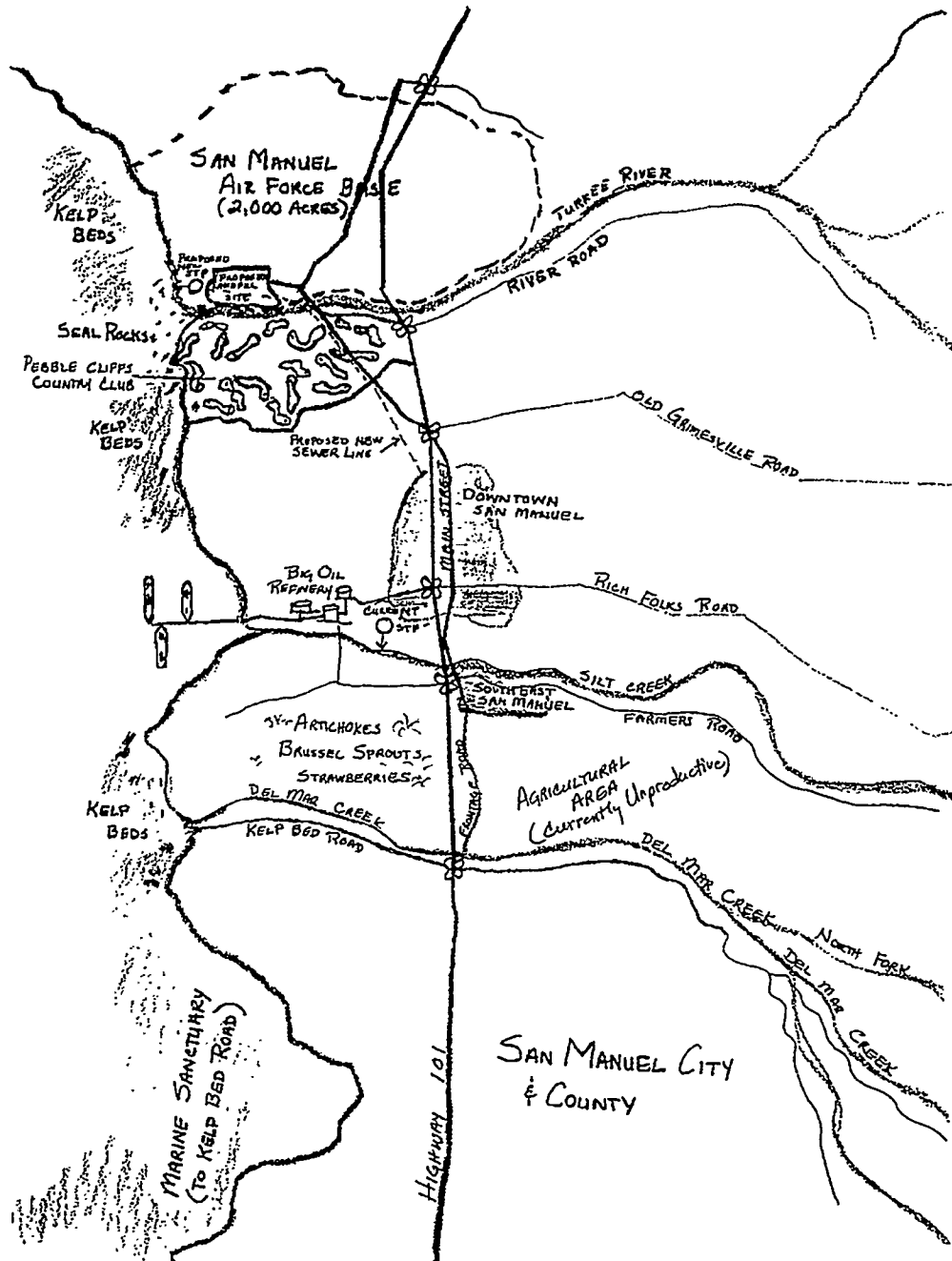
For CUTS:

- We have obtained an internal memo showing that greater than half the overall cost of remediation is for cleanup of the five-acre staging site. You're just trying to get out of it by using the electron beam technology. You can't put enough BAD bugs in the ground to eat tons of VOCs. Clean up the staging site

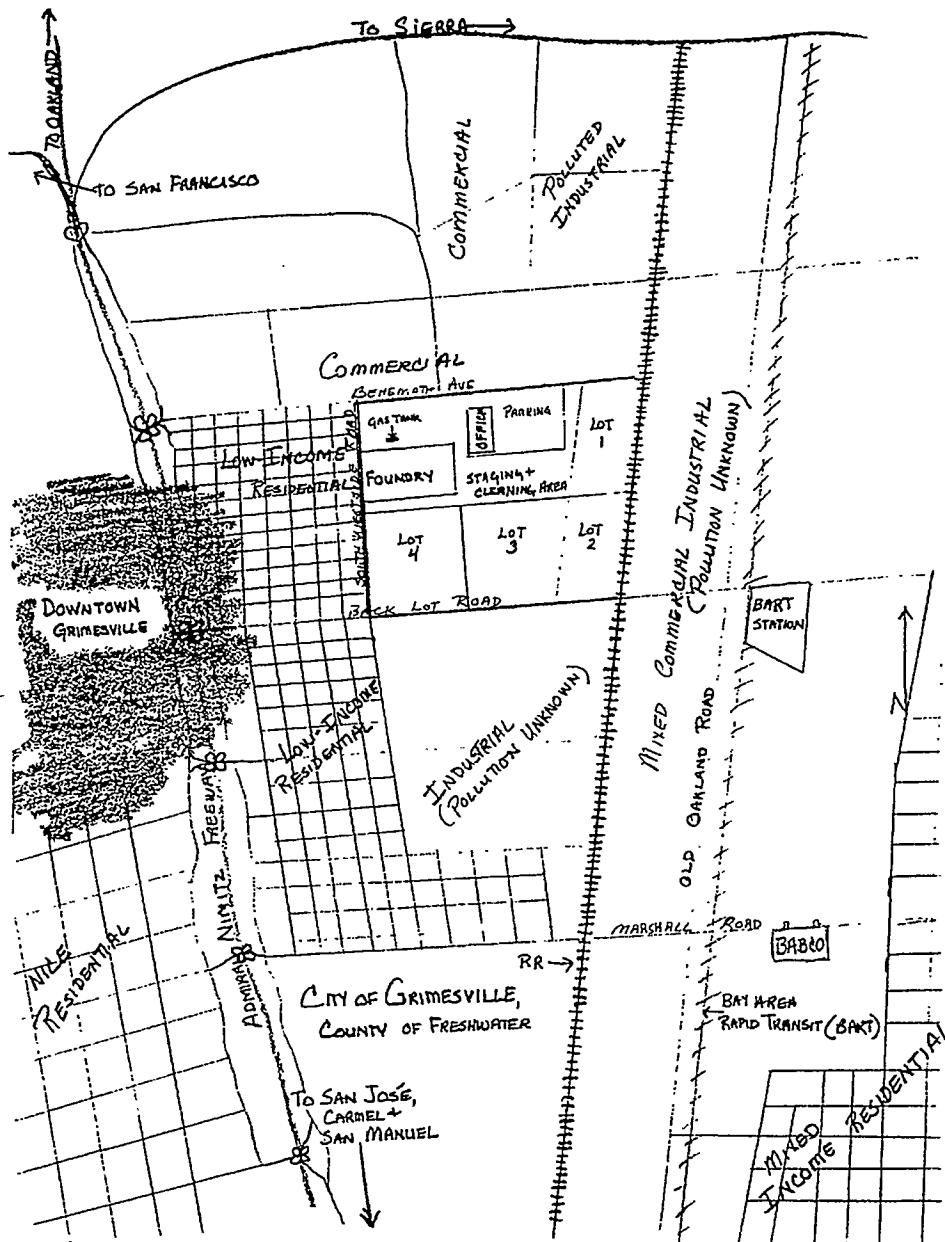
using either the electron beam or old remediation technology.

- Pouring solvents on the ground is inexcusable, especially for the last 40 years when good disposal methods have been available. Given this breach of public trust, you have no right to profit from sale of the land after nominal cleanup. We will seek to have all profits placed in trust for the additional cleanup years from now that will be necessary to fix problems that will inevitably occur.
- If you poured stuff on the ground for so long here, you must be doing it at other sites. We call for a full investigation of your practices at all sites.
- The electron beam technology is unproven. Provide proof of concept and also detailed data on cleanup efficiencies.
- The by-products of your process are not mentioned. Are you going to have some unknown gas spewing into the atmosphere in our neighborhoods. Define your by-products and how they will be contained and properly disposed of. They could be worse than what is there now.
- There is no proof that the Restore BAD bug technology works. Provide this.
- This new technology is unproven, and will certainly cost more than is estimated. Use the old proven technology.
- Treating the groundwater and top levels of soils are fine. But there's no way you can reach the deep soils just above the aquifer. So we're still going to get more carcinogens in the groundwater. What are you going to do about it?
- Prove that the electron beam technology works for water pollution, and that your throughput is enough to handle the problem.
- We don't believe you can clean the ground good enough for people to live there. In just a few years we will have stuff coming to the surface that will harm the residents. Prove that the land will be habitable.

San Manuel, California



Greenville, California (formerly Grimesville)



RESULTS AND OBSERVATIONS

Summary and Objectives

Prosperity Games are games of discretion and judgment and, therefore, need to be analyzed in the context of human interactions. Analysts observed each team's actions and recorded their understanding of the underlying dynamics. They were chosen for their experience in interdependent group situations and for their ability for objective analysis. The analysts were there to understand the underlying motivations and actions that led to the play within the game.

The players were instructed in the handbook and in the initial briefing to develop strategies and plans to accomplish both the game's objectives and their personal goals. Various strategy types were presented with indications as to which might prove more robust and penetrating. They were also encouraged to take risks and to innovate.

**Take risks
and innovate**

The success of a Prosperity Game depends on the game design and execution, but most importantly on the players themselves. In all previous games we have observed that those players who most highly value the objectives of the games derive the most benefits. The lessons learned in the game must be applied to real life in order to be of value.

This was a highly complex game because of the large number of stakeholders, the prior existence of adversarial positions, and the web of regulations and hurdles that exist in the environmental arena.

The game demonstrated that the current system is badly in need of repair or complete revision. Existing regulatory systems, entities, and processes are much too expensive, time

consuming, and cumbersome to serve the ends for which they were created. The condensed time frame of the game made this indelible point: An entirely new paradigm is needed for all the stakeholders in the environmental arena. Developing such a new system will not be easy.

In previous games, players often developed highly creative solutions to problems and challenges. Such creativity was not strongly implemented in this game, perhaps due to the nature of the environmental systems and processes, or the failure to realize that creative initiatives were highly encouraged. Blue Team 1 recognized the need for a paradigm shift, but suggested that the new paradigm could be created by the game designers and tested in a future Prosperity Game, rather than be created by the players themselves.

The four scenarios were constructed to be quite environmentally positive, and the technologies were displayed as having attained a reasonable level of maturity. Despite this, no team met all its requirements before the five-year deadline, although all ultimately succeeded.

Specific Objectives:

One-stop permitting

The game appears to only have begun to investigate strategies for developing a multi-agency one-stop regulatory approval process. For example, the federal, state and regional regulators were highly supportive of a one-stop permitting system at the outset of the game. However, they very shortly realized that they couldn't agree on the definition of such a system, or how it would impact the multitude of regulators and regulations. However, throughout the game the regulators worked on legislative bills to develop this concept. The Legislative Team, with input from the regulators and others, passed two important bills. One created a National Technology Certification Program for all media (air, water,

soil, solid waste, etc.), delegating authority and funding to the US EPA, and specifying a pilot program in conjunction with the state of California. They also passed the "1997 Environmental Reorganization Act" for California that included some very innovative thinking in technology certification, testing, evaluation, and permitting (see page 191). The bill is sufficiently well thought out that it could be submitted to the next session of the California legislature.

One disappointing aspect was the lack of participation by the industry/technology teams in the legislative hearings process. Some Blue Team members indicated little faith in the legislative process.

Identify regulatory hurdles and requirements and best approaches to surmounting them

Most players thought that the tangled web of requirements were realistic, and accurately portrayed. However, no creative solutions arose in the game, and many situations were adversarial and confrontive, rather than collaborative.

Identify technical problems and potential resources to solve them

The Supplier Team was used extensively throughout the game, but predominantly in a verification mode. Most of the Green Teams were willing to accept the labs and universities as "honest brokers." This implies that the labs could be used in that role much more often than is current practice. The labs and universities can also offer assistance in the development of new technologies, as they did in enhancing battery performance for Babco.

General Objectives:

Develop partnerships, teamwork and a spirit of cooperation

Many of the teams, but not all, developed excellent working relations, both within and

between teams. Those that did were more successful.

Increase awareness of the needs, desires and motivations of the different groups.

Success on this objective was mixed, as would be expected. Although some teams and players were able to see both sides of certain issues, others dug in and were quite inflexible. However, all requirements were eventually met. Feedback indicated that personal relationships had been established, and that future real interactions among these people would be enhanced by the shared game experience.

Bring conflict into the open and manage it productively.

Success on this objective was also mixed; although conflicts almost always arose, they were not well managed in some cases.

Explore long-term strategies and policies.

This goal was not met. The game designers had assumed that many teams would satisfy their requirements early in the game, and turn their attention to long-term planning and new paradigms. However, the difficulty involved in meeting requirements and negotiating deals consumed most of the available game time.

Provide input for possible future legislation.

Given the inexperience of most of the legislative players, we believe that they were remarkably successful in drafting, debating and passing helpful legislation. Many of the potential solutions to environmental problems and regulations are amenable to legislative resolution. Taking the ideas from the game into the state assemblies and Washington would be a useful goal of future workshops or games.

Provide a learning experience.

The game functioned as a condensed mini-university multidisciplinary course for many players, even those already familiar with the process. Learning experiences covered environmental regulations, business and finance, negotiations and deal-making, legal requirements, law making, technical issues, and many other aspects related to business and government. The depth of learning may not be realized by some of the players until some time in the future. Although some players said they were very familiar with the regulatory processes, that familiarity did not enable them to satisfy their requirements any faster than novice players — experience did not seem to improve performance, an indicator perhaps of a disfunctional system.

Team Highlights

Industry Teams

Two of the industry teams represented single companies, Restore and Babco. Two teams represented joint ventures or partnerships between a large and a small company. The play of the two partnerships were quite different from each other. Big Oil and Clohi (ROCAR) quickly adopted a big company - little company mindset. Big Oil bought a controlling interest in Clohi on the first day, and made it clear that they would “call all the shots, both financially as well as who was responsible for dealing with the public.” Clohi would work exclusively on the regulatory issues.

Although Big Oil’s negotiations with the Environmentalists sometimes became heated, they were able to reach a compromise decision. Dealing with the public, however, went from good to bad. The Public took Big Oil to court. Despite offers to arbitrate by the Mayor of Grimesville (Customer Team), the two teams refused to compromise. Internal dissension within ROCAR also contributed to

the lawsuit continuing for “one year,” and costing ROCAR 1/10th of its initial funds.

Although questions of leadership, direction, and dissent arose during the game, the analyst felt that the group became a “team” by the end of the game.

In contrast to the hierarchical structure and strong-leader style of ROCAR, the CUTS teams developed a collaborative approach at the outset. No power struggles occurred between Behemoth and Electra. Team members exhibited a high level of trust in each other, no one attempted to dominate, and individuals evolved specialized roles spontaneously. Although the team members were very entrepreneurial, one team member subtly became the anchor (de facto “CEO”) and almost always remained at the table to provide continuity.

A major difference between the two joint ventures appeared to surface at the start. Behemoth and Electra (CUTS) identified joint objectives and agreed that they were “in it together.” They felt that the two companies “must collaborate to succeed.” They committed to the partnership and pledged not to explore other technology-oriented partnerships because it might detract from their joint success; they never deviated from this commitment. On the other hand, Big Oil and Clohi (ROCAR) were more interested initially in defining boundaries and lines of authority and accountability; they concluded that ownership rather than partnership was the way to execute the joint venture.

Restore split into three subteams to address the Green Team requirements as well as technical and financial needs. They focused on getting the demonstration landfill built within the 5-year time frame. They succeeded, despite being faced with a multitude of hurdles by expanding and additional requirements, as well as surprise

inspections by a joint Federal/State team which uncovered “numerous violations” of RCRA provisions. Restore players attributed their success to trying to be proactive (vs reactive), staying focused, cooperating where possible, and compromising. They felt that the game was “eerily familiar.” “What needs to be done is to shift paradigms, get new rules oriented towards problem-solving, compromise, win/win, certification, one-stop permitting, process and operational audits, and bring new technologies on line ASAP.”

Babco only had three players, but they chose to try to succeed anyway. They divided the work and began to meet requirements, as well as negotiate future deals for marketing (Gary Motors) and product improvement (200-mile battery). Events overtook Babco and they found themselves in breach of contract for not delivering batteries. Babco recovered from this setback, developed new suppliers and markets, and met all requirements.

All four Blue Teams met their requirements by the end of the game. However, most did not develop long-term strategies, nor did they generate innovative concepts for improving the process.

Environmentalists

The Environmentalist Team worked out a set of objectives to guide their play. The technologies should be: sustainable, without long-term irreversible damage, have minimal short-term impact, and be equitable across generations, regions, classes, etc. The analyst described the team as “more accommodating than stereotypical environmental activists.” Although they tried to avoid polarization, they still were able to achieve substantial progress toward their objectives.

The team felt that they were quite successful in achieving their requirements, setting aside open spaces, and influencing legislation, all

without resorting to litigation or bribery. Considering the large number of lawsuits filed in the environmental arena, it seems that this team may have learned and applied some useful and practical strategies.

The Public

The Public focused on jobs and protection against worst-case accidents. They also adopted special interest group causes, minorities, labor, etc. Some Public Team members sought equity in the entrepreneurial teams, an unusual tactic that was resisted by some of the Blue Teams. Although the Public felt that that resistance was unrealistic, this analyst believes the reverse — members of the public rarely if ever receive equity in companies. Indeed, the situation is often the reverse. Communities often offer tax incentives, industrial bonds, and other perquisites to attract companies or to keep them located in their communities.

The Public formed two organizations, GOD (Greensville Organization for Development) and Envirolink. They also filed suit against Big Oil, ultimately winning \$800K and other concessions

Regulators

The Regulators recognized the difficulty of the current regulatory system with multiple stops (perhaps 40). They were concerned that the true complexity could not be simulated with three groups. E.g., for Restore, they said that “A landfill could not be permitted in California within five years” given the multitude of approvals required. They also could not decide how to treat the different media (air, water, land) with only three groups. Ultimately, they split into three teams: federal, state and local.

The three teams developed requirements for all the industry teams, and also began working on new legislation addressing: one-stop permitting (with a demonstration involving the

Restore landfill); extension of the California technology certification program; and developing a national certification program with California serving as a pilot.

Negotiations with industry proceeded relatively well and all teams passed their requirements in five years. However, several untoward events occurred along the way including: concerns about poor reporting in the press; the arrest and trial of two local regulators on charges of corruption and accepting bribes; discovery of violations at Restore's landfill site; and allegations of data falsification.

The regulators believed that they were more helpful toward the industry teams than they would be in real life. However, the "Reality of the game corresponded to real life, favorable -- pretty accurate, and surprising." The team felt that "We have the vision but have structural difficulty implementing it... The stress of the system bogged us down and made us live day to day.... daily permitting decisions and constant demands make it tough to stand up in a proactive way."

According to the analyst, "The Green-R team had good intentions to work at a higher level, but got stuck in a 'carpe diem' [seize the day] style."

Based on this simulation, a new paradigm would seem to require that those most intimately involved with the daily problems be given the time and authority to suggest new processes and concepts.

The analyst also noted that at the start of the game that "...the facilitator almost had to pry the one group apart into three subgroups because they wanted to work together ... for one-stop shopping. Once the three subgroups became autonomous with some degree of individual power... they functioned separately.

This [may] be a common trait relative to bureaucracies in that, despite good intentions, once individual power is tasted, it is difficult to pass up."

Customers

The Customer Team was very proactive, going after contracts and forming consortia. The team elected mayors of San Manuel and Grimesville. Both mayors were successful early in the play. They seemed comfortable with the level of chaos, in contrast to the industry representatives who felt that they weren't operating effectively early in the game. Part of this might have been due to the fact that the mayors were welcomed at the Environmentalist and Regulator tables, while the industry representatives were viewed as being driven solely by making money.

Gary Motors was aggressive in trying to do business with Babco, but Babco was later unable to deliver the promised production. Gary Motors ultimately entered a lucrative partnership with Finance to supply a clean combustion system for diesel engines.

DoD, DOE and the Mayor of San Manuel teamed up to promote and protect the landfill technologies. They tried to sell a total package of base cleanup, economic stability for the community and environmental quality of life.

Urban Sprawl got involved in a sting operation against two local regulators. Although this event provided some interest, it negatively impacted all subsequent initiatives by Urban Sprawl.

Finance

Finance began slowly; they were not excited by offers from the companies, nor were the companies interested in Finance's counter offers. They formed a combined venture capital - bank called "Shark" with a motto "Your extremity is our opportunity." However,

on the second day, the team became highly entrepreneurial. They developed a plan to first go to Jefferson Labs (Supplier Team) to get a patent on a new technology for complete, clean combustion for diesel engines. They would then convince the state and federal EPAs that these units should be installed on all new trucks, and retrofitted to existing trucks. They would then offer the use of their patent to Gary Motors for \$500 per unit. They eventually succeeded in accomplishing their goal, and claimed a profit in excess of \$2 billion!

According to the analyst, "... socialization, familiarity with the possibilities of the game, and the competitive instinct all combined to increase the tempo during the second day.... I think the use of Business Teams (Finance, Blue Teams) provides an indispensable contact with 'reality'."

Judicial/Legal

Two points of view arose in the team: one strongly favored mediation and dispute resolution and the other promoted client advocacy. Both views were realized, and the team reached a tenuous compromise. In contrast to the prototype game where no legal suits were brought, three cases were adjudicated in this game. One involved a "double-sting operation" where the defendants were accused of accepting a bribe to allow development of contaminated land. The three judges voted for conviction; however, a Karma Kard reversed one opinion, which the judges misinterpreted to result in a hung jury.

The second case involved failure of Behemoth to pay its taxes. Repeal of the tax law rendered the case moot. The third case involved a class-action anti-trust suit by the Public against Big Oil. Mediation was attempted, and ultimately succeeded.

The team candidly viewed its own behavior in the game and the real-world similarities. They

observed that it was easy to make money in the legal business, that successful mediation required flexibility from all parties, that lawyers performed valuable services in educating clients as well as representing them, and that the legal profession thrives on conflict. In contrast, the real world may be more litigious than the game simulation.

Legislature

The team initially divided into various state legislators representing different constituencies. They conducted hearings to address important and reasonable legislative issues. They also wisely purchased the services of an environmental legal consultant. Their first legislation was the *1997 Environmental Reorganization Act*. It subjected all local Air Quality Districts to the authority of the California Air Resources Board, and extended Technology Certification by CalEPA to all permitting authorities in the state. This bill provided significant details on the certification process, provided the necessary funding, and authorized CalEPA to develop and implement a plan and program for technology certification (see Appendix J). This author believes that the bill, as written, should be given serious consideration by the California legislature.

The state passed several other bills including establishing a Pilot Certification Center, funded at \$3 million; and loan guarantees up to \$1 billion for High Technology Enterprises.

The team also assumed the role of Congress. In that capacity, they repealed a previous tax, and proposed a bill that directed the administration to abolish the Environmental Protection Agency within two years. This bill was ultimately defeated. A bill creating a National Technology Certification Program with a pilot project in California was passed.

Although many teams participated in the hearings and legislative processes, the industry

teams were largely absent. The business teams seemed skeptical of the legislative process, and preferred alternative approaches to accomplishing their objectives.

Suppliers

The supplier team was predominantly used as an independent and unbiased broker to validate technologies and to do site assessments, evaluations, and testing. The team was enormously successful in this role and accumulated a large amount of money. Two team members took \$10M and left for Brazil. (They eventually returned and did not face criminal proceedings.)

The team behaved in a reactive mode, responding to customers' needs and requirements. They performed little R&D, and seldom took the initiative (perhaps realistically simulating the behavior of many labs).

Because the supplier team agreements were relatively easy, the team occasionally became bored. For some teams, more failures may be required to stimulate creativity and action. The team recognized that they were used mostly to get other teams out of trouble, but that they could have offered significantly more value in the game context.

Team and Player Dynamics

Although the players came from the upper levels of their organizations, a leader often arose among the leaders. Frequently, this person led the team without the other players recognizing that this was occurring. The leader could assist or hinder his team, depending on his or her ability.

The game was initially designed to have players exchange places to experience other roles and constituencies. However, the players selected to make these changes were very reluctant to do so. It appears that once

team bonding has occurred, player exchanges should not be attempted.

The games are designed to maintain a constant and high level of interaction. However, some time is allocated for reflection, planning, and creative problem solving. A challenge to the designers and players is to accomplish both goals in a single event.

Strategic Planning

All teams were exposed to the ideas of the eight levels of information processing and strategic planning as shown in Table 3. In the in-briefing, the teams were encouraged to move to higher levels of strategic planning. Although they were faced with urgent crises in the game (as in real life), they were encouraged to move to problem solving approaches that were progressively more robust and penetrating. Albert Einstein was cited as a person who could process information at level 8. Nevertheless, several teams evaluated themselves and their team as operating at level 8. Figure 2 shows how the players evaluated themselves and their teams in terms of processing levels. At midgame, the self-assessments were spread over the whole spectrum from 1 to 8. Most players evaluating their own performance and their team's as roughly comparable.

By the end of the game, the average assessment had dropped almost a full level (from 4.8 to 4.0). This assessment was lower than the estimates of most analysts, which ranged from 5 (*carpe diem*) to 6 (parts for the whole); however, the analysts did not believe that any team reached levels 7 or 8.

**Table 3. INFORMATION PROCESSING AND INFORMATION COMPLEXITY
EVALUATING TEAMING, STRATEGIC PLANNING AND COMMUNICATION**

Stratum	Longest Time Horizons	Information Processing (Development of arguments)	Information Complexity	Strategy Analogs	Logic Analogs
I	1 D	Declarative	Symbolic Verbal: Words represent concrete things; managing day-to-day work tasks		
II	3 M	Cumulative			
III	1 Y	Serial			
IV	2 Y	Parallel			
V	5 Y	Declarative: separate unconnected reasons	Abstract Conceptual:	<i>Carpe Diem</i> - Seize the Day	Disjunctive; or-or
VI	10 Y	Cumulative: connect several different ideas, none of which is sufficient, but taken together, they make a strong case	Using abstract complex concepts to solve problems; corporate, national, global thinking; politics, environment, culture, social change, finance, economics	<i>Partes Pro Toto</i> - Parts for the Whole	Conjunctive; and-and
VII	20 Y	Serial: construct a line of thought, a chain of linked reasons		<i>Crescit Eundo</i> - It Grows As It Goes	Serial; if-then
VIII	50 Y	Parallel: construct several serial processes with cross-linking to emerging external trends; develop contingencies		<i>Impetus Futuro</i> - Force for the Future	Parallel; if and only if

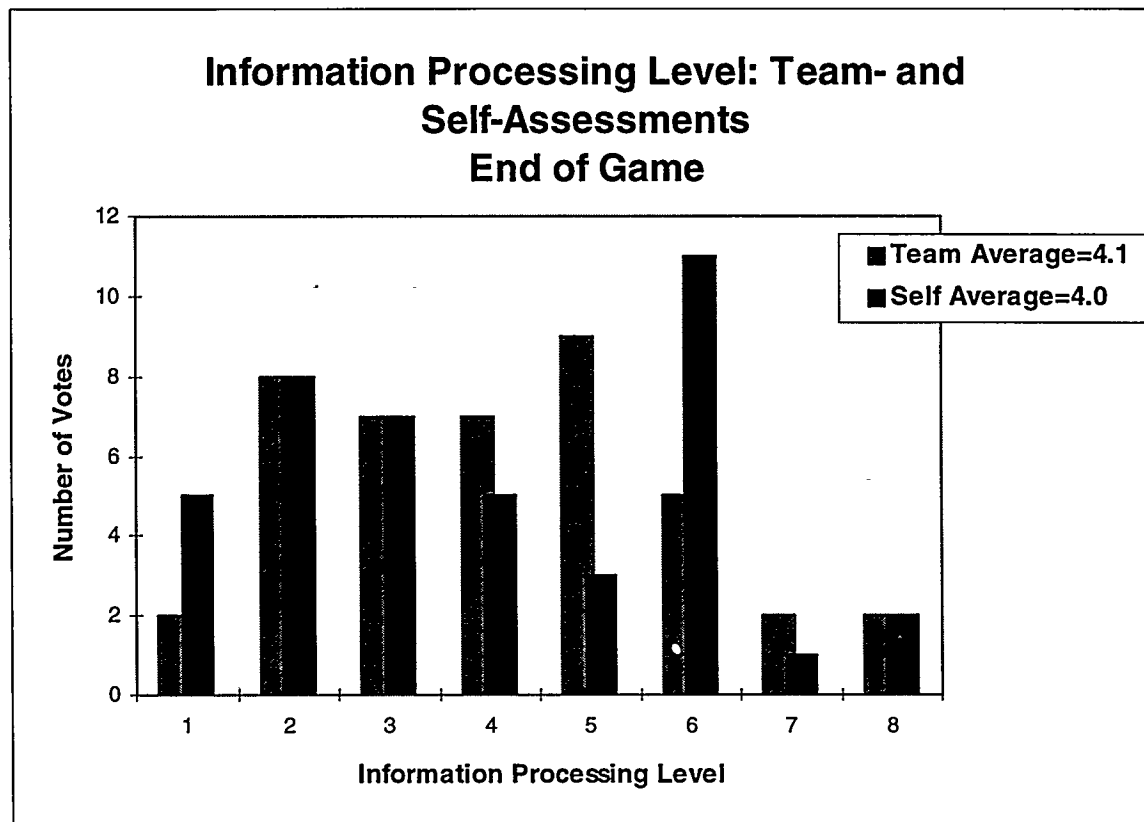
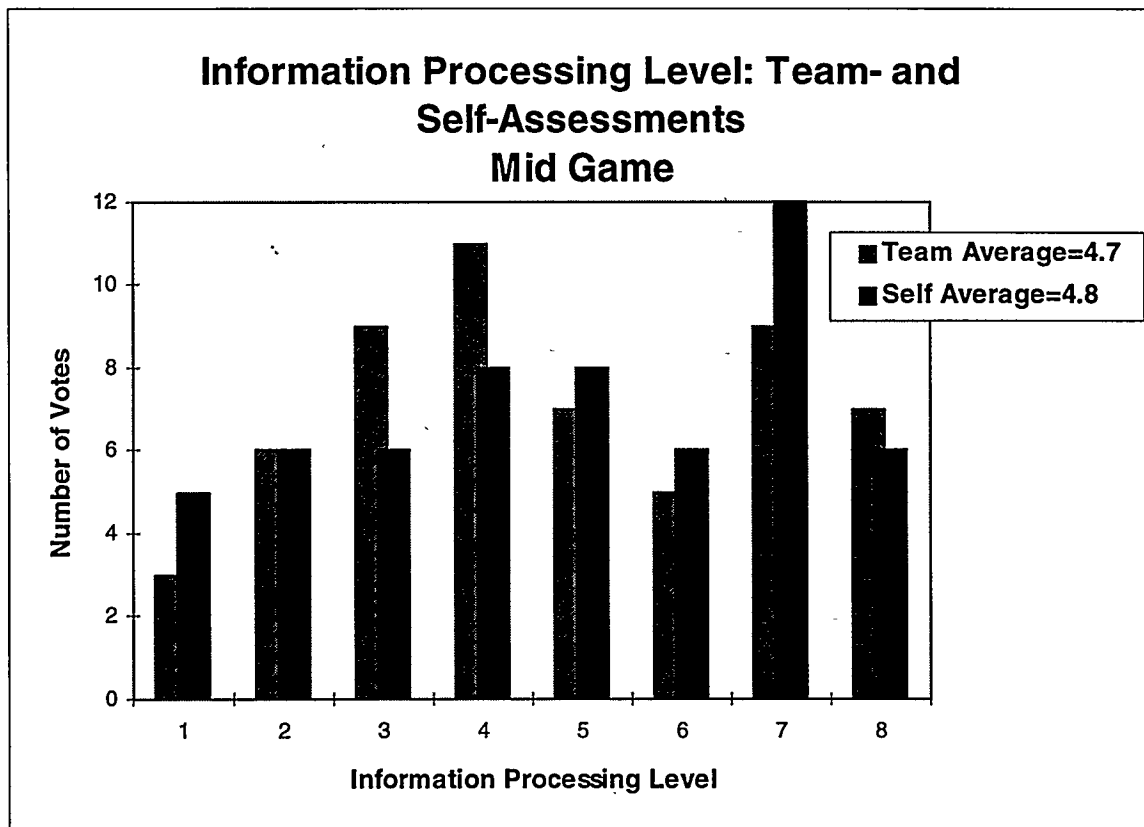


Figure 2. Self-Assessments of Information Processing Level

National Environmental Summit Meeting

The purpose of the Summit was to encourage the players to briefly step out of the game environment and debate the issues themselves. The Summit provided a forum for identifying and discussing problems that may or may not have been incorporated in the game scenarios. Twelve questions were proposed, and the teams chose the following three to address. Various opinions were expressed, not all of which were in agreement.

Question 1: Do we need to establish a unified local/state/national policy for standards of environmental remediation based on health risk assessment factors as they relate to land use? How would it work?

Most participants agreed. A standardized basis would be needed in order to rank the most difficult problems first; health risk assessment would be the best way to set these priorities. However, a concern was raised that a single set of standards might lead to a "lowest common denominator" approach. Formal mechanisms need to be developed on a state and national level that would streamline the permitting process; this doesn't mean that uniform standards would be imposed throughout the US.

Question 2: Should we create an incentive-based regulatory compliance system that facilitates environmental health and safety for private and public facilities?

We need to move from compliance-based standards to a performance-based system. There currently is no incentive to introduce technologies that go beyond compliance, even if they do a much better job, and at lower cost. State regulators are locked into this system and old technologies. This is a big role that a

certification program could play. It could help to move the state to higher level performance-based standards.

California has two separate certification programs (air & hazardous waste). One certification program would be an improvement.

Based on business brought to the Yellow supplier team, most people are reactive, and not interested in moving beyond compliance. They did not think or plan long-term.

We are spending too much time solving immediate problems and not looking beyond the next year. The public is interested in a process to encourage companies to act in more environmentally conscious way.

The public is concerned about "fly-by-night profit mongers." We want the companies to behave in an environmentally conscious manner; perhaps we should use some scoring system to encourage companies to be good.

Good tough laws are needed in order to achieve compliance. Costs need to be reflected in products rather than the taxpayer having to pay. Make people pay as they pollute, and reward those who don't.

The environmentalists believe that "You don't have the right to pollute. Incentives are not necessary. Compliance is key."

The regulators said that it is important to have incentives for cleanup. They can take several forms; recognition is one. They can be incorporated into good performance standards.

ROCAR believes that new technologies should be granted some relaxation of penalties; otherwise, there might not be any new technologies.

Venture capitalists and banks are not going to be willing to provide funds without some incentives. Banks need a reasonable chance for success.

We now have minimum standards and there is no incentive to exceed those standards. Industry, government, and communities need some reasons and mechanisms to go beyond standards.

Question 3: How can we best protect communities from fly-by night corporations with unproven technologies?

The public believes that this is a huge problem, because companies want to get rich quick. Companies come in, go bankrupt, and leave problems for the community to deal with. How can we distinguish the good guys and good technologies?

CUTS: We need to forget the idea that there are a lot of people getting rich quick. Environmental companies are paying out large sums, but they are losing money. I have good statistics to support this point. Misinformation is being put out that companies are getting rich.

This is a free enterprise system. You should check out what you are investing in. It is the community's responsibility to check out all the facts. We have to figure out a way to make environmental products available to people at a reasonable cost.

Red-Judicial/Legal: It's hard to believe that the industry is entirely pure; there are some bad apples. This brings us back to certification. A technology can be certified by a community and information shared.

Public: In many states there are lemon laws; you buy what you think is a good product, but

get a bad deal. If we can do it for cars, why can't we do it for the environment?

Restore: Environmental technology is new and the same lemon laws cannot be applied.

CUTS: We don't need lemon laws to guard against bad companies; they fail and go out of business. We need some guidelines and standards, a certification system that is widely recognized and effective. A proactive process will prevent some problems, including future litigation.

Restore: Look at the computer industry and the standards that are need for connectivity. The standards came from industry, not government. Maybe we need to do the same thing.

Environmental technology cannot be compared to the lemon theory. You don't need a lemon law to protect environmental technology. A tremendous amount of money could be wasted by companies testing technology. It makes sense to set up a certification system that is recognized by industry, state, etc. Validation will do what it is supposed to do. Companies with good technology will get on the list and bad companies will not continue in business.

The best certification may come from companies that people trust.

The Green Regulator team has introduced several bills in the game to enable certification. If you feel that is the way we need to go, we need your support in that area. There is room for private analysis as part of the certification process, but there must be mechanisms to obtain government certification using that private analysis. The certification process must be across the board; the lab results must be universally accepted.

Independent lab certification is not enough. It won't be recognized from community to community.

General Comments

Our economic system does not include full costing.

In real life, there is far more litigation.

The legal team is doing what it normally does - stirring up more litigation.

In real life it is very difficult to get a new technology on line. This has been much too easy.

The people participating in this game are high-level and knowledgeable and the game can progress fairly rapidly. In real life you would be dealing with people at a much lower level. If that knowledge could trickle down, the process could speed up.

GAME EVALUATIONS BY PLAYERS

Interdependence

One of the game objectives is to foster collaboration and partnering, especially in the environmental arena which often leads to confrontation and conflict. The players were asked how willing they were personally to consider interdependence despite these adversarial relationships, and how willing they believed others to be. At the start of the game, players confirmed the perception that other people were much less willing to collaborate than they were themselves (see Figure 3). On a

scale of 1=very little to 5=very much, the players assessed themselves a very high average score of 4.3; others were given a neutral score of 3.

At the end of the game, the self assessments dropped slightly to 4.2, but the assessment of others increased 10% to an average of 3.3. The number of 4s and 5s assigned to others increased from 42% at the beginning of the game to 57% at the end.

Need for Regulatory Improvement

Figure 4 shows the players' estimates of how much the environmental regulatory arena needs improvement. There was no change in average scores; i.e., the game confirmed previous beliefs.

One-Stop Permitting

Views on the need for a one-stop multi-agency permitting process increased slightly over the course of the game, as shown in Figure 5. The number of 4s and 5s increased from 73% at the beginning to 81% at the end of the game.

Trust

In order for collaboration to succeed, trust must be established among the various adversarial groups. As shown in Figure 6, levels of trust in different groups changed slightly or not at all as a result of the game. Trusting business showed an increase of 13% over the game, but this may not be statistically significant.

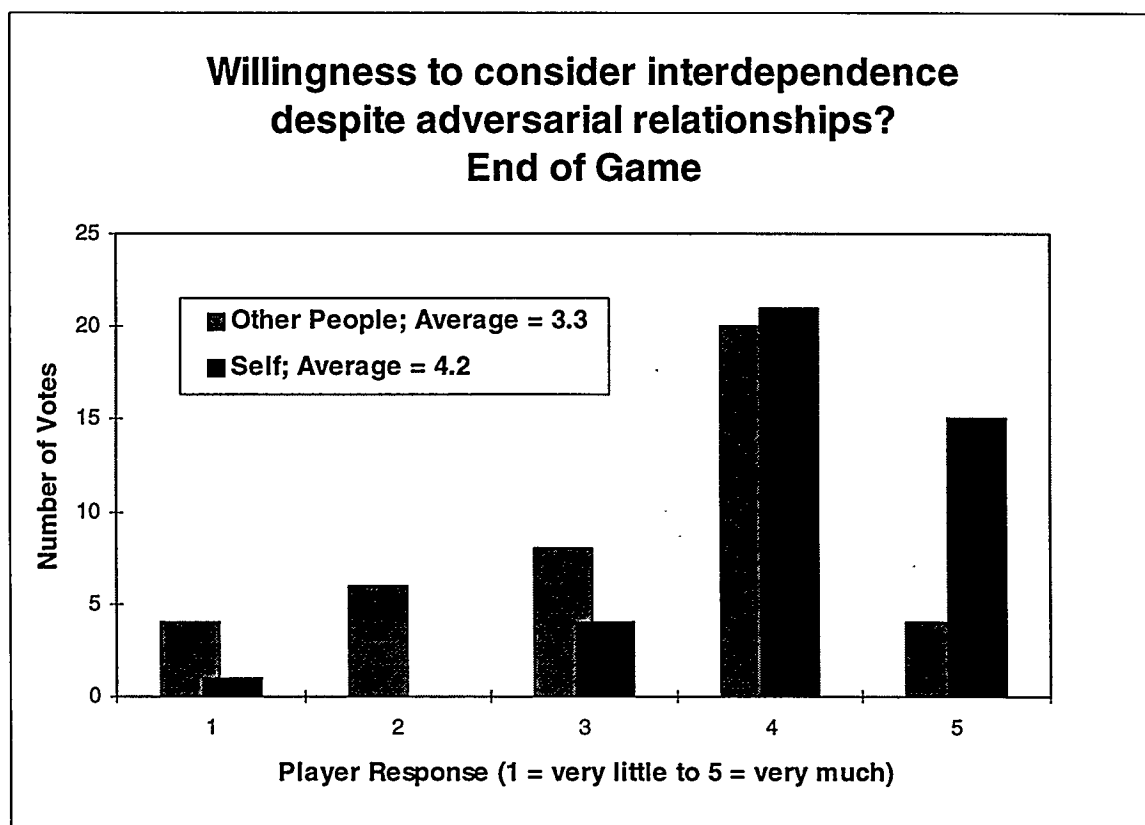
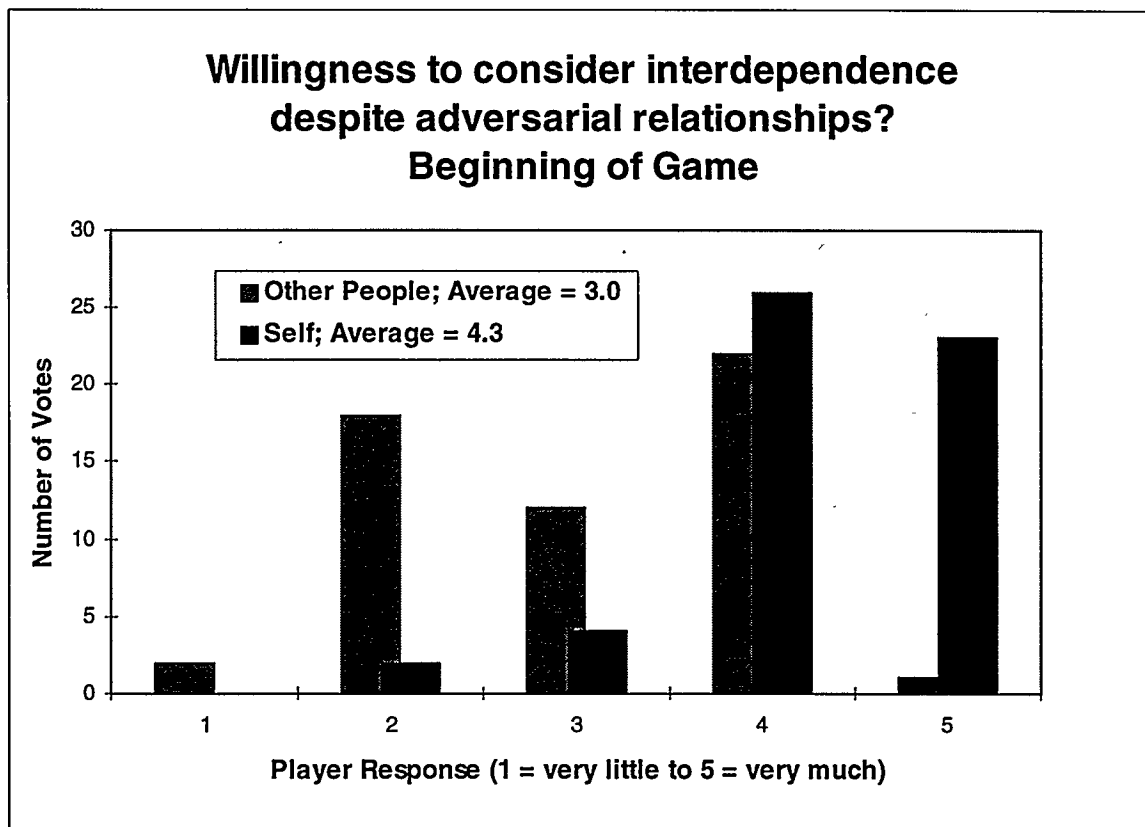


Figure 3. Self-assessment of willingness to consider interdependence.

How much does environmental regulatory arena need improvement?

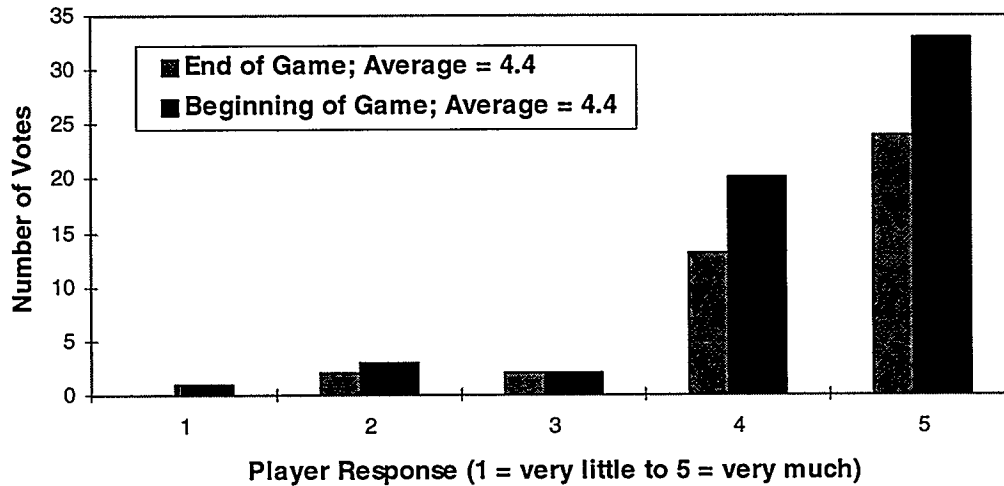


Figure 4. Need for regulatory improvement.

Would a one-stop multi-agency permitting process be beneficial?

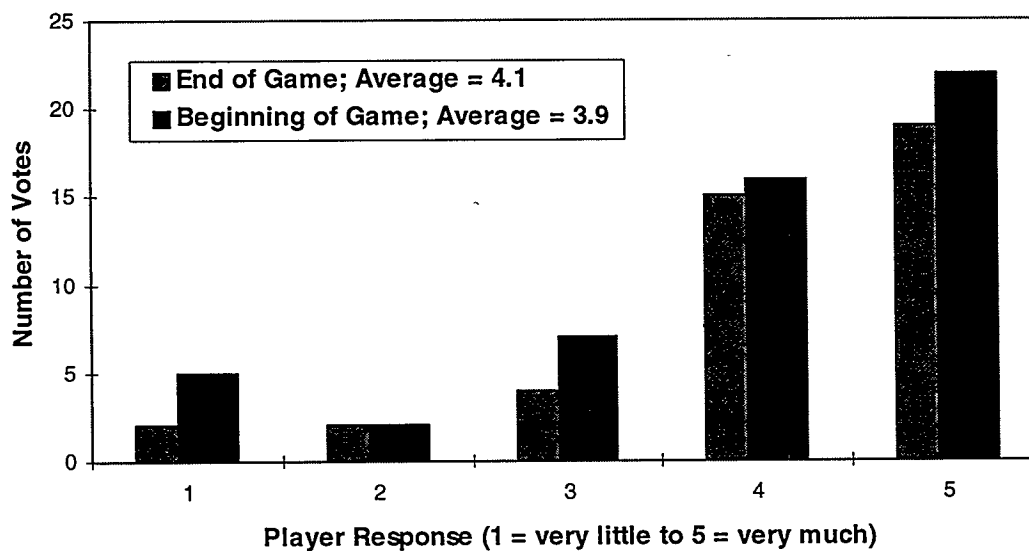


Figure 5. How beneficial would a one-stop multi-agency permitting process be.

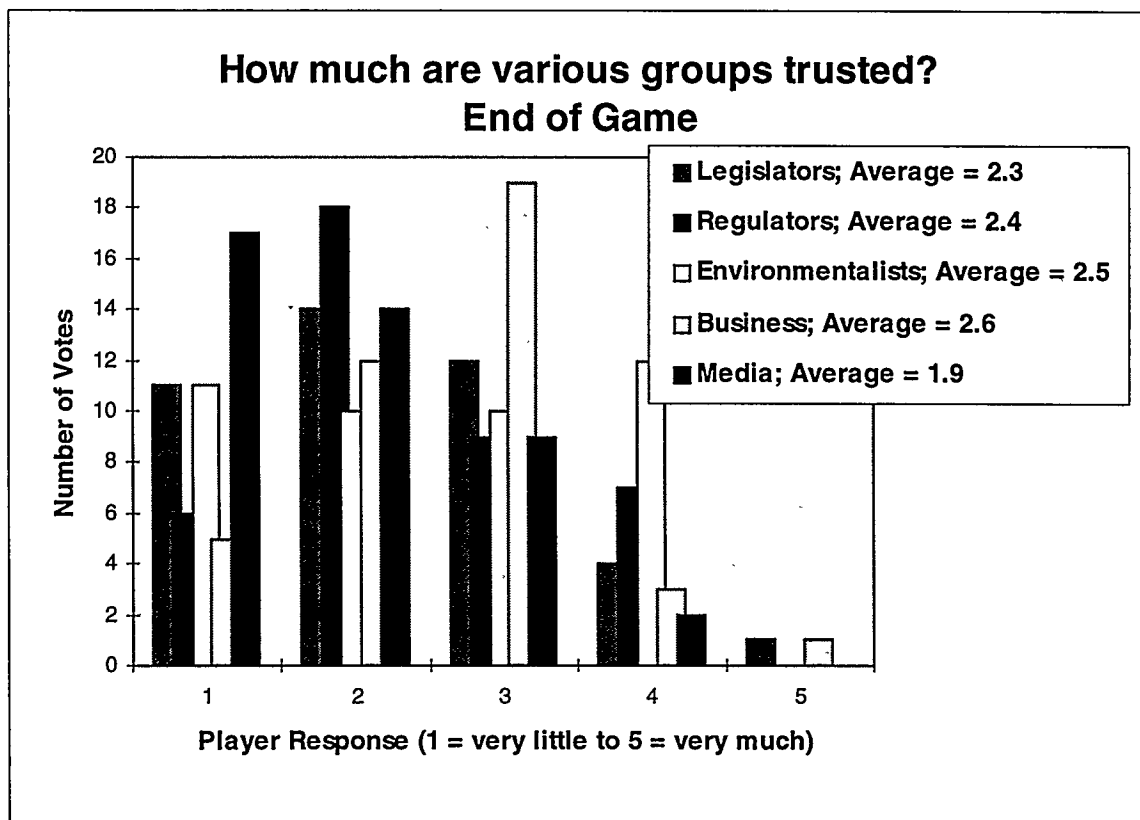
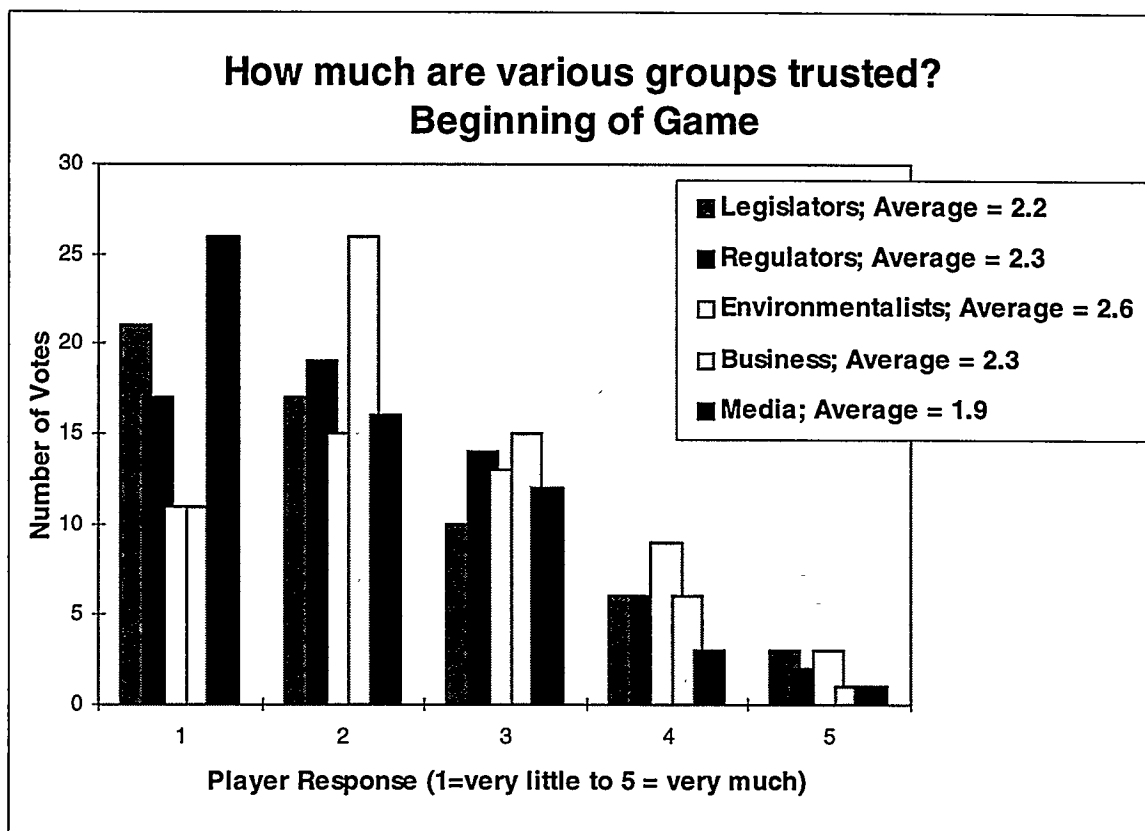


Figure 6. How much are various groups trusted.

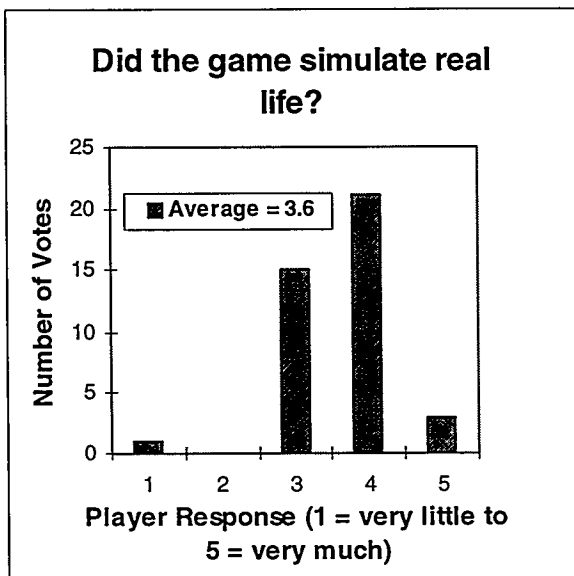
Generic Objectives

As in previous games, the players were asked to evaluate how well this game accomplished the generic objectives of Prosperity Games. Answers to these questions allow us to continue to improve the quality of the games. All answers are based on a scale of 1 = *very little* to 5 = *very much*.

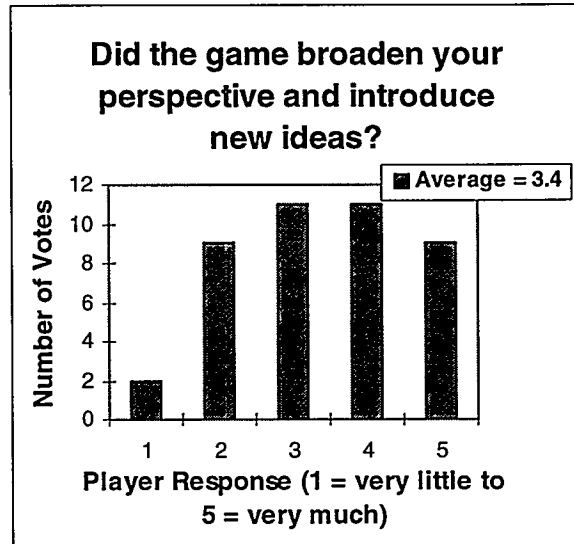
The vast majority of players had a rewarding experience (average = 4.2). 88% scored the game a 4 or 5.



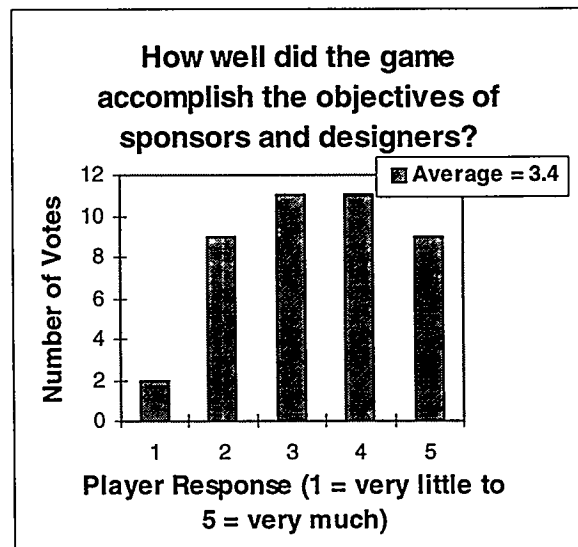
Most also believed that the game did a reasonable job of simulating reality.



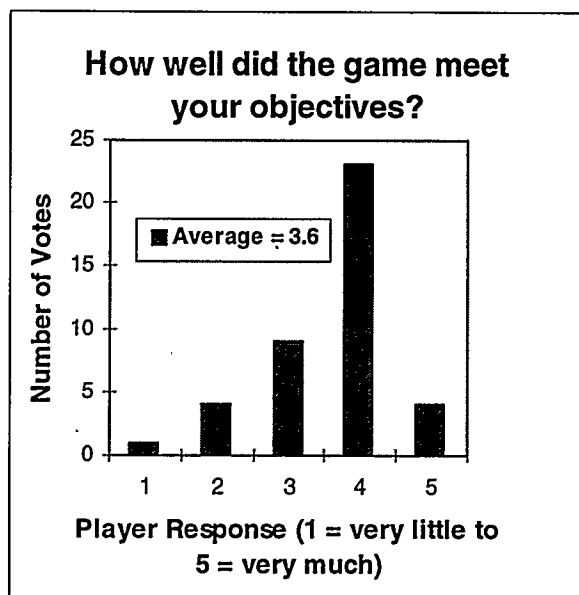
About half the players believed that the game broadened their perspectives (48% voted a 4 or 5). About a quarter were neutral, and a quarter did not feel that new ideas were introduced.



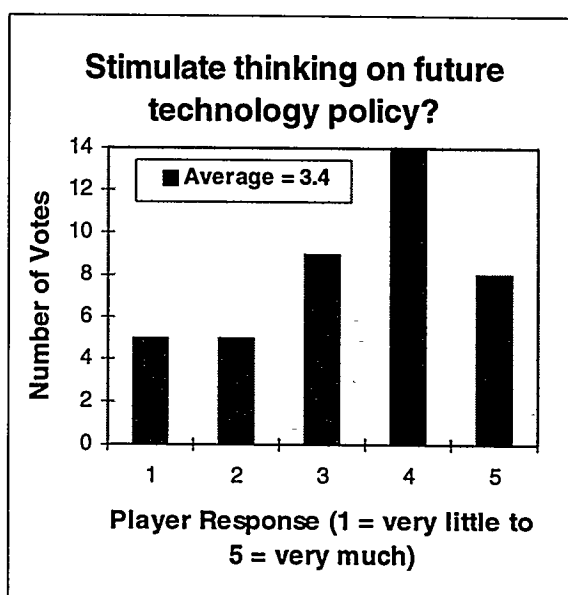
The players were also divided over how well the sponsor's objectives were met, with an average score of 3.4.



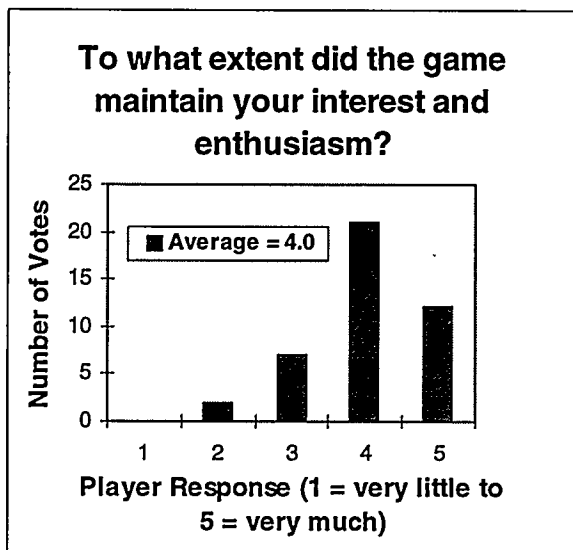
The players were a little more positive on how well their own objectives were met, with an average score of 3.6. Two-thirds scored a 4 or 5.



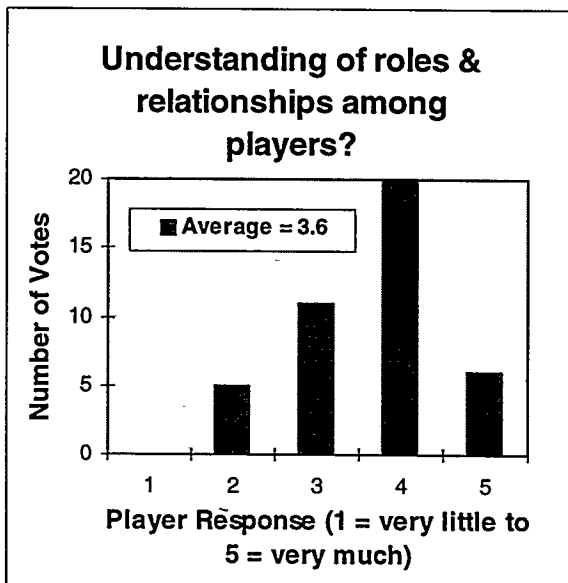
The players felt that the game maintained their interest quite well, with an average score of 4.0, and with 80% scoring a 4 or 5.



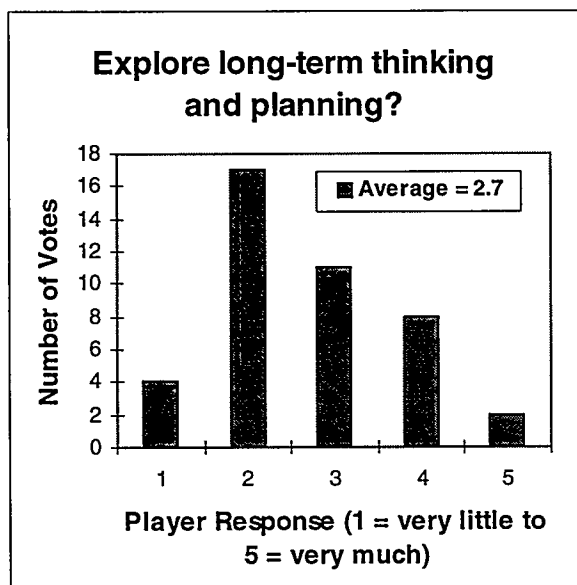
Most players understood the roles and relationships among the different stakeholders, but the average score was moderate, 3.6.



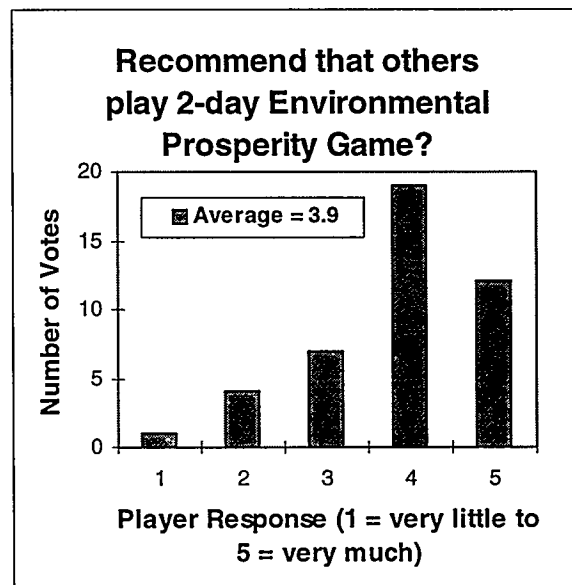
Diverse views appeared on how well the game stimulated thinking on future policy, ranging from *not at all* to *very much* for different players.



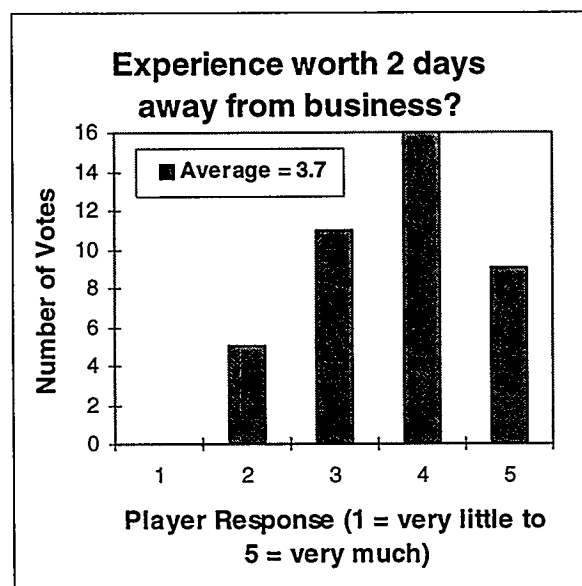
Players in general did not believe that long-term thinking and planning were explored in the game, assigning a relatively low average score of 2.7 to this game objective.



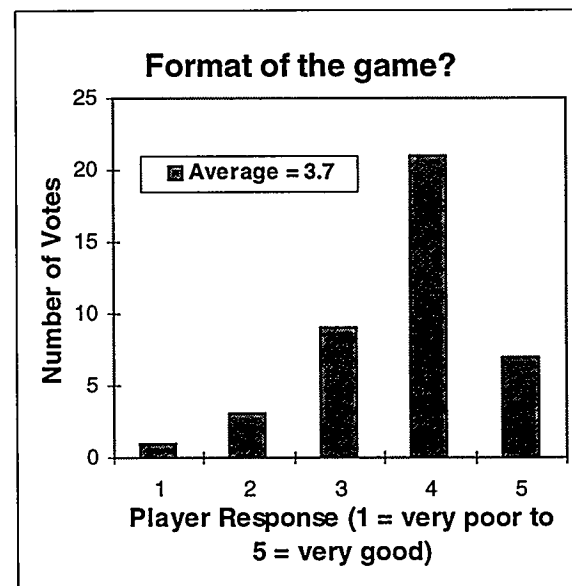
Most players believed the experience was worth the invested time; 61% voted a 4 or 5, with an average score of 3.7.



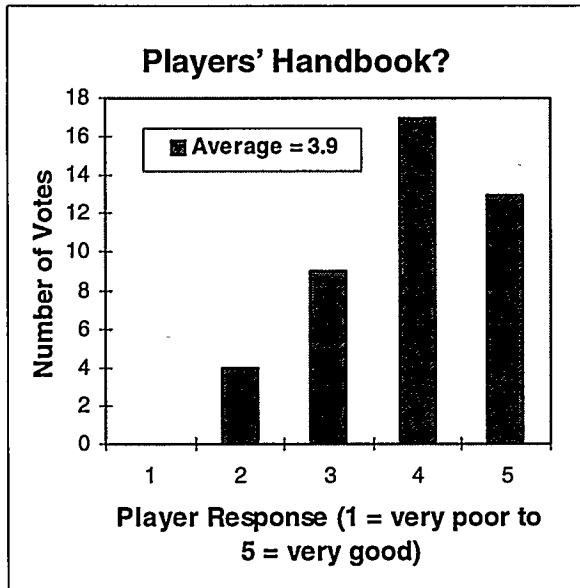
Most believed the format of the game was good, with 68% voting a 4 or 5, and an average score of 3.7.



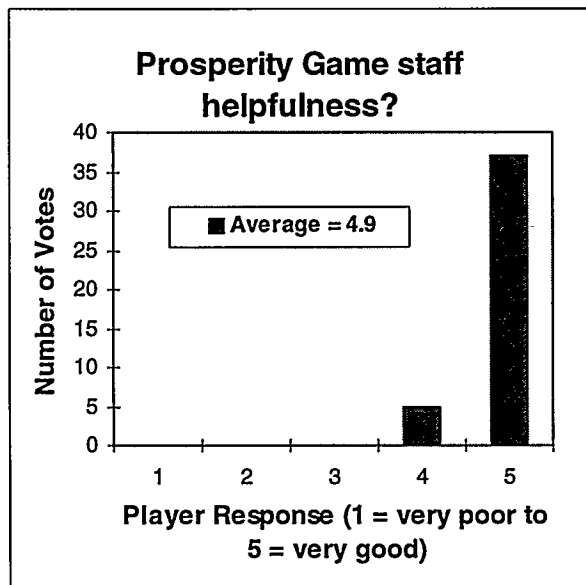
They were even more positive in terms of recommending a Prosperity Game to others, with 72% voting a 4 or 5, and an average score of 3.9.



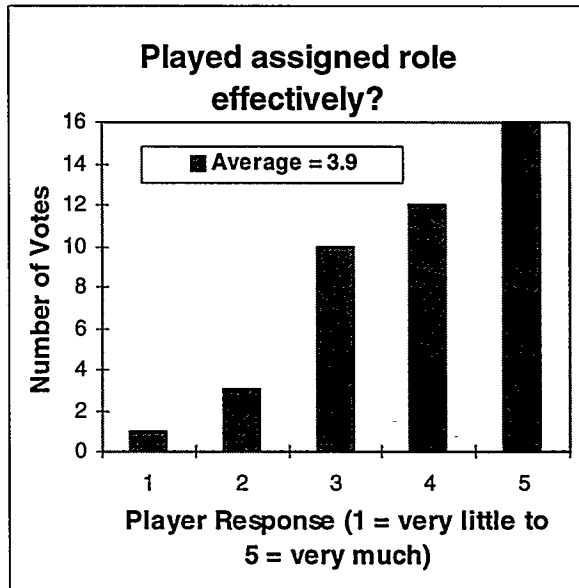
The Players' Handbook also scored well, with 70% 4s or 5s, and an average of 3.9.



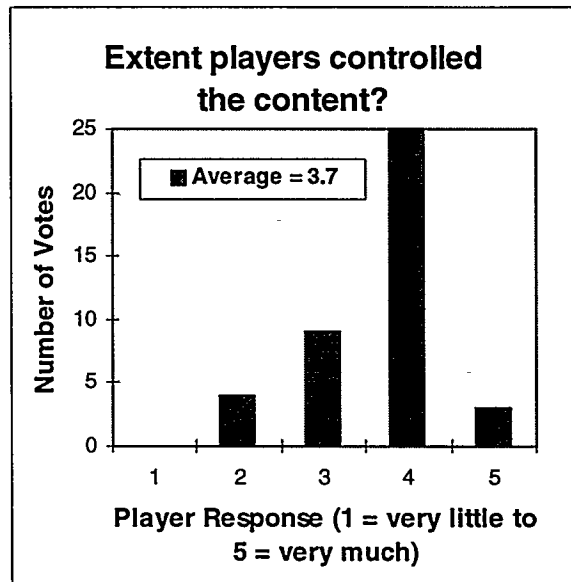
The highest score to date was assigned to the helpfulness of the staff, an average of 4.9.



Most players felt they could play their roles effectively, although a few felt uncomfortable or unfamiliar. Average score was 3.9.



68% of the players believed they controlled the game content, with scores of 4 or 5. However, a few felt they did not.

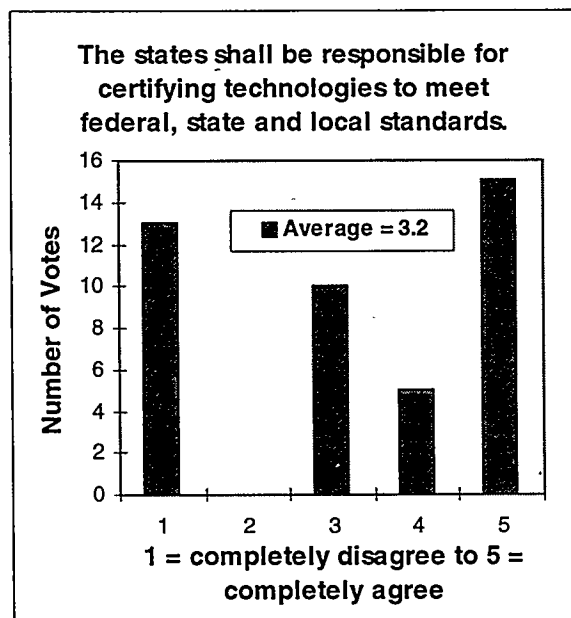
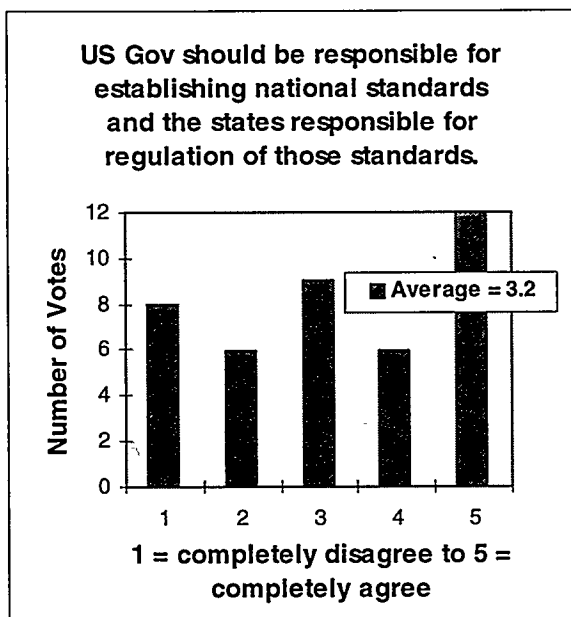


Legislative Initiatives

As part of the evaluation process, the Legislature team requested a poll on four issues. The issues and results are shown below.

The players were strongly divided on the issue of national environmental standards set by the US and regulated by the states.

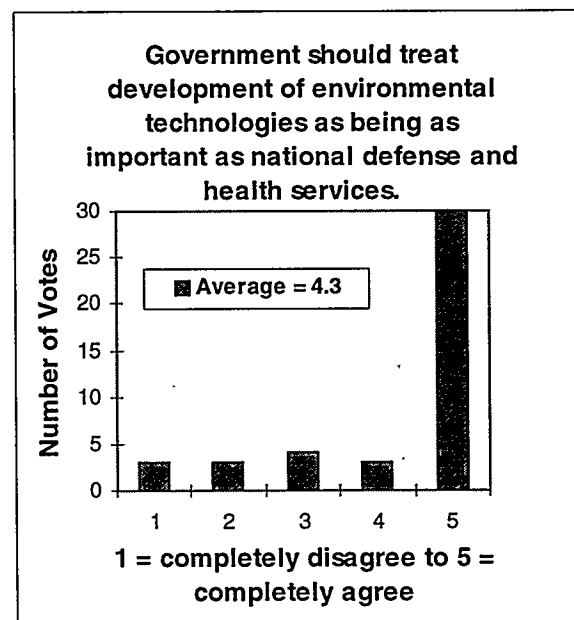
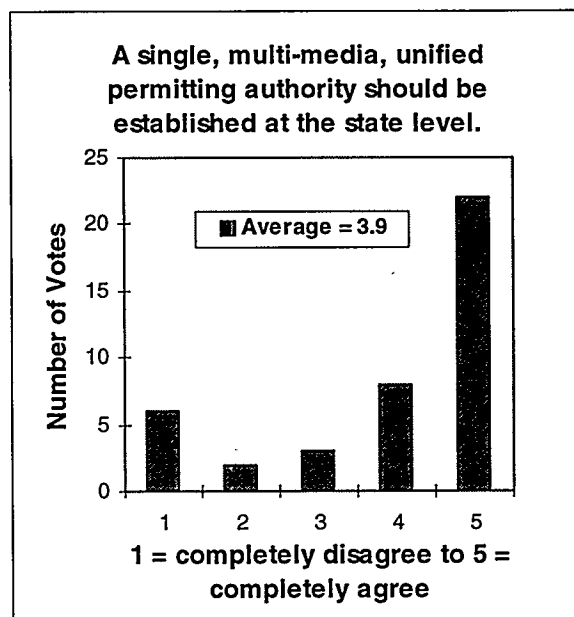
They were also polarized on allowing states to certify technologies to meet federal, state and local standards.



Although some players were strongly opposed to the one-stop permitting process, the majority favored the concept.

The vast majority of players feel that environmental technologies are as important

as defense and health. However, a few disagreed strongly.



LESSONS LEARNED

The rapid growth and continued success of Prosperity Games depends on learning from past games, and applying these lessons to future games. Comments were received from players, analysts and facilitators concerning perceived successes and flaws in this

simulation. Some of these ideas have already been incorporated into game design and execution.

Balance

A successful Prosperity Game involves balancing several opposing forces. E.g., players are expected to deal with urgent crises, but still find the time to plan for the future. They must fully understand current realities while they simultaneously explore alternative futures. They are expected to defend their constituencies, but look for areas of collaboration and partnership.

Similarly, the game design should maintain a high intensity level to stimulate creativity and excitement, but not overstress the players' ability to engage. Of course, the varied personalities and styles of the players make this balancing act difficult. A few players felt overly stressed in this game, and could not maintain the pace. The facilitator and Control modified the players' workload and environment to accommodate this stress.

On the other hand, some players became bored for several possible reasons: their activity was not sufficiently high; their prior activities had been too successful, which interestingly led to increased conservatism and lowered activity; they were not internally or externally stimulated to look for creative solutions and to think on a long-term basis. Some of these concerns can be addressed by a more interactive facilitation process, and some by changes in game design. Some things, however, can not be fixed because they depend on the player's own abilities and personalities.

One measure of game-wide activity level is the number of agreements and contracts that are consummated as a function of time in the game. By this metric, the game was quite well

balanced over time, as shown in Figure 7. Figure 8 is a similar plot of agreements versus time for the NEMI game.²

Unevenness in game activity level due to player or team variability can be addressed by facilitator actions alone or in concert with the Control team.

Probability of Success of Investments

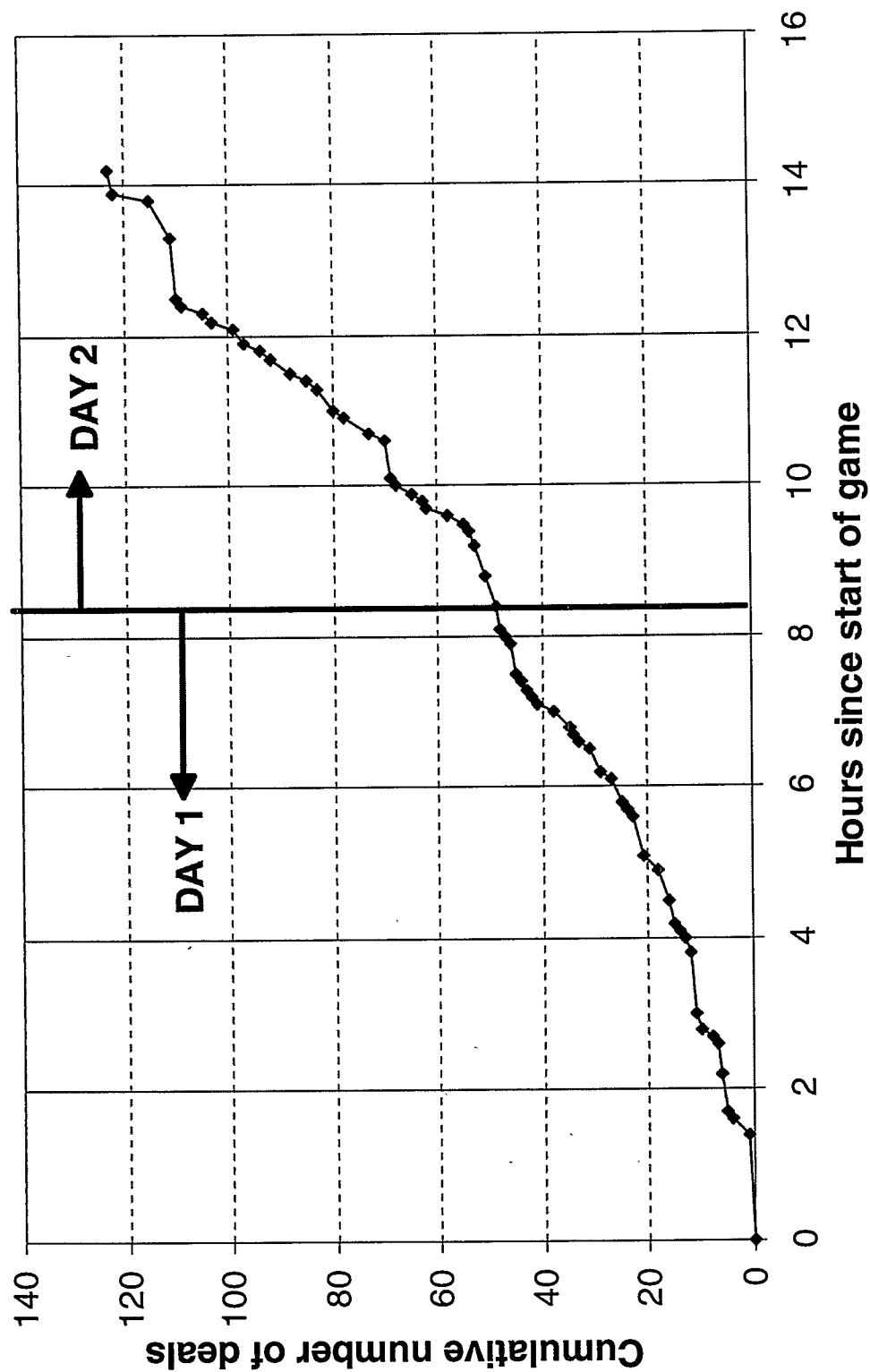
Several people believed that, in the game, the success probability was somewhat unrealistic and too high. Several players indicated that there are factors other than investment amount that determine success or failure of research, testing, certification, or other uncertain events; for example, scientific or engineering uncertainties; variations in competence among those performing the research; and other unanticipated problems or changes

Figure 9 shows the probability curve used in this game — a normal distribution with standard deviation equal to one-half the mean. This distribution yields a probability of 98% for an investment of twice the mean. Since most investments were of this magnitude, the vast majority of them were successful.

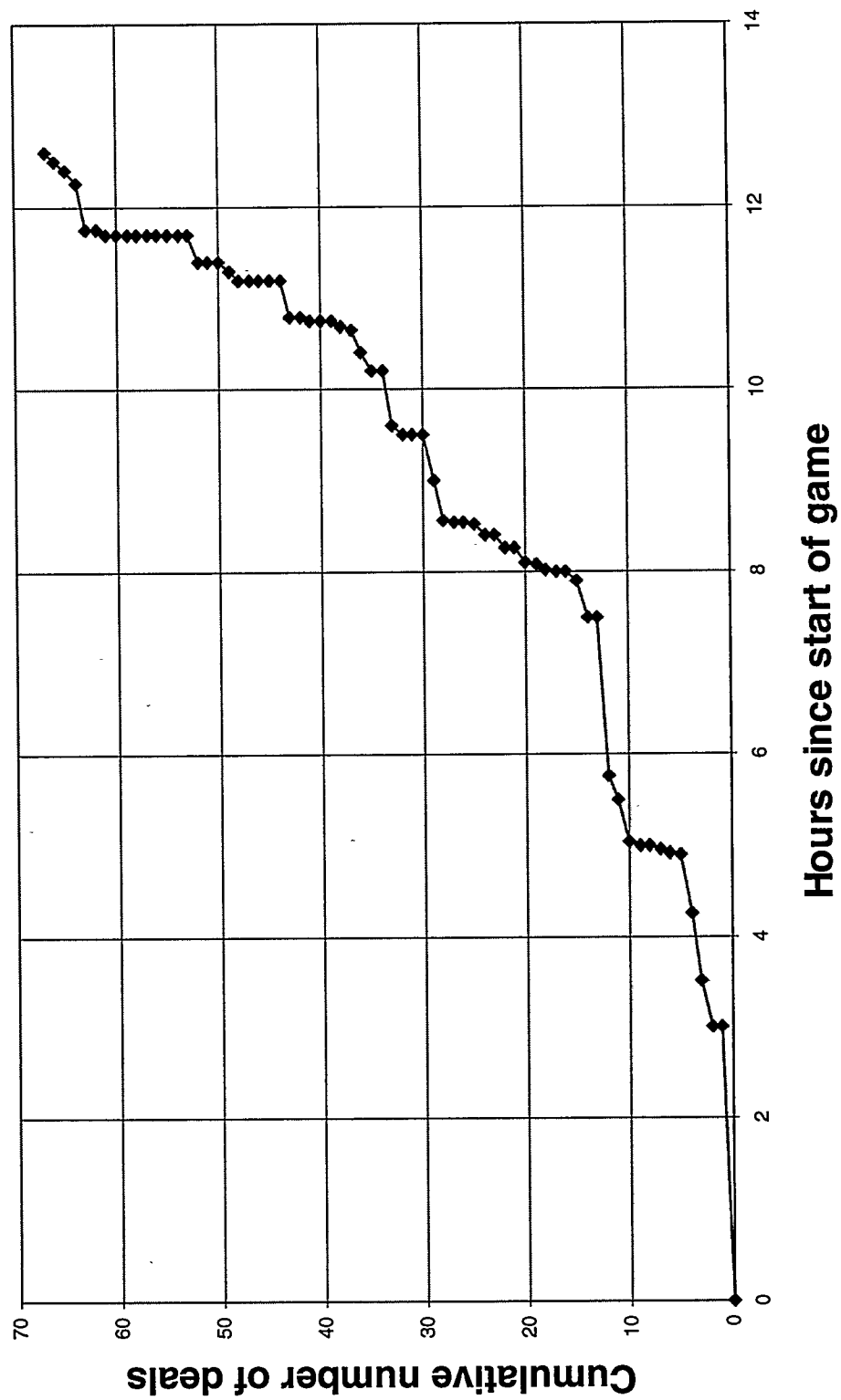
These concerns have already resulted in a change in the probability distribution. Future games will use a basic normal distribution with standard deviation equal to the mean (rather than half) as shown in Figure 10. For this flatter distribution, an investment of twice the mean yields a success probability of 84% (rather than 98%). Further, a uniform distribution will be applied about the mean probability that allows variations of $\pm 16\%$; this variation is intended to more accurately

² M. Berman, I. Berry, and J. P. VanDevender, "Prosperity Game for the National Electronics Manufacturing Initiative," SAND95-0724, May 1995.

**Figure 7. Total Number of Deals Executed
Over Environmental Prosperity Game**



**Figure 8. Total Number of Deals Executed Over
NEMI Prosperity Game**



Success or Failure of An Investment is Determined Probabilistically

Example: \$1M provides 50% probability; \$0.5M = standard deviation

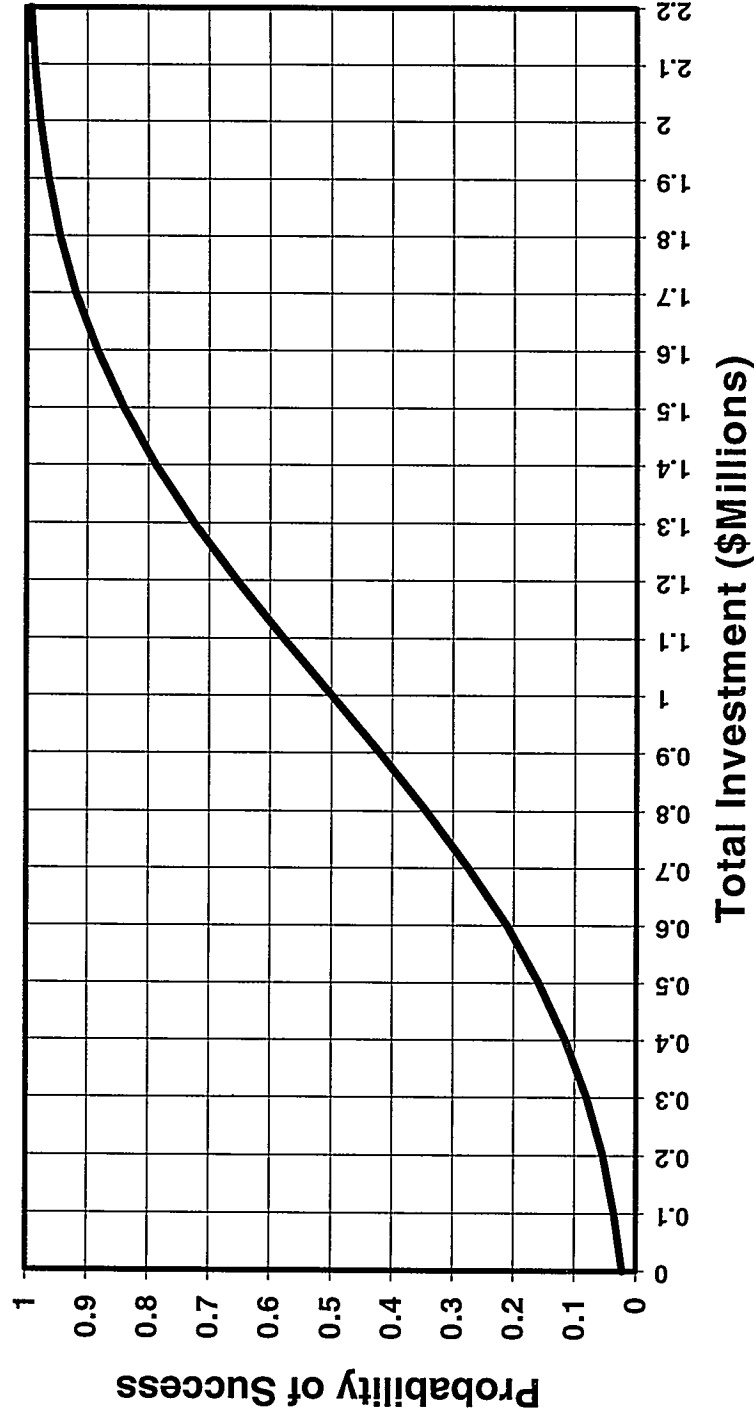
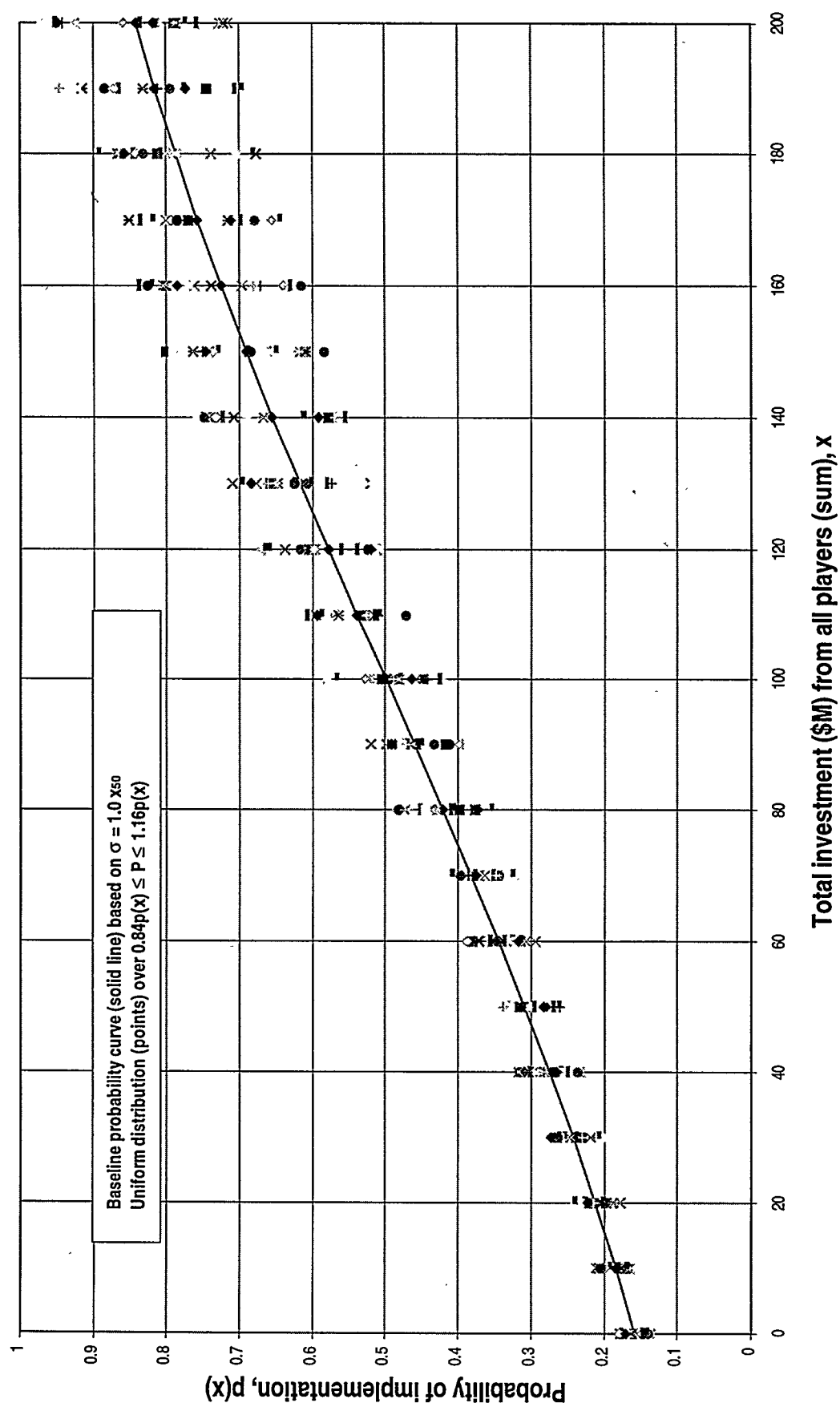


Figure 9. Probability Distribution and Standard Deviation Used in Environmental Prosperity Game

Figure 10. All future or uncertain outcomes are determined probabilistically



reflect the uncertainties of future outcomes that are not proportional to investment amount, and that are unpredictable. These changes are intended to more accurately reflect the difficulties of predicting the future, and stimulate the players toward creative solutions.

General Comments

HANDBOOK:

- Need more background information.
- Prepare a “blueprint” for successful negotiations on environmental issues.
- Supply Handbook to players on disk three weeks before the game.
- Provide more guidance to the teams.

INBRIEFING:

- Spend more time going over rules of game.

KARMA KARDS:

- More Karma Kards to add realism.
- Should have been more realistic in terms of fines for EPA violations, non-functional technologies, strikes, etc.

PLAYERS:

- Have greater expertise for each team. Place at least 2 established and experienced business people on the business teams.
- Each team needs a technologist.
- Assign one lawyer to each team.
- Don't switch team members.
- More role exchanges across teams.
- Need more hard-core environmentalists.
- Players must understand that they have to come prepared.
- More minority inclusion (but perhaps you tried).
- Some participants took things personally. This could hurt potential real-life relationships.

POLLING:

- Conduct poll before final presentations.

- Feedback is a good concept.
- More controversial, more specific.
- Have audience submit questions.
- Improve the questions.
- Questions were quite complex.
- Questions were pertinent/relevant.
- Very good technique and instructive.
- Very good system of taking a straw vote.
- Good questions, but too many.
- Questions were a great idea. Need more.
- Delete these.
- Not too enthusiastic about the process.
- Use “yes-no” questions.
- Ask about environmental values (radical, conservative, etc.).

PROCESSES:

- Too easy to get successful results.
- Probabilities should not ensure success as a function only of dollars.
- Technology R&D success tied to financial model is unrealistic and too easy.
- Provide planning/reassessment retreats.
- Provide on-line data bases and internet.
- Put calendar on screen.
- More opportunity for feedback.
- Put regulatory pressures on customers.
- More mixing at meals. Require lunch and dinner with other teams on a non-game basis.
- Shorten dinner speech to 20 minutes max.
- Shorten the game.
- Game length is appropriate.
- More time for decisions to be made.
- Great format but I felt that the incentives were there for business but not for government and environmentalists.
- Add social scientists to the design teams.
- Use one scenario rather than four.
- Need better method for simulating financial income and payouts.
- More unknowns should be thrown at the players during the course of the game.
- Have a central log of all agreements.

RADIO BROADCASTS:

- Increase frequency.
- Additional communication mechanisms.
- Regular updates via e-mail; computers at each table

TEAMS:

- Split Public into two or more teams.
- Make Legislature keep up with rest of game. Legislation too slow.
- Legislators should be given specific profiles and constituencies.
- Have an election at midgame.
- Separate the Suppliers into subgroups.
- There should be a role for intermediary companies (e.g., CH2M-Hill) that typically are major players in the process. These intermediaries are sometimes much more risk averse than the small and large organizations that were modeled in the current game.

FOLLOW-ON ACTIVITIES:

- Describe the world 5 years later.
- Small half-day workshops on streamlined cleanup and permitting, dispute mediation.
- Future game to test new realities.
- Run a game for the City of San Jose.
- Game in Oakland involving community, business, education, labor, etc., and a 20-year strategy.
- Environmental roadmaps for California.
- Develop an opportunity for all game participants to participate in multiple games and to surf that learning curve.
- Focus some of the games on public policy challenges.
- This would be an excellent tool for university entrepreneurship programs.
- Publish report on the game.
- Games on other environmental problems.
- A follow-up session with role switching.
- Is there some way of keeping in contact with this group?
- Look at some of the legislation; these ideas may be worth testing and examining.

Congress may provide a small grant to support a game.

- Hold workshops to develop future games.
- Consider games for Superfund scenarios. It would be good to play out bills proposed by Congress before they were passed.
- A game to implement the new technologies developed at this game.
- A more detailed game to specifically address a single remediation.
- Games that can be played through e-mail.
- Send out follow-up questionnaire.
- Train Environmental Partnership volunteers to replay the game with new players.
- Take this work into the social service sector.
- New games should focus on pollution prevention or pollution clean up.
- Teach construct of problem solving, collaborative approaches, parallel processing.
- Recreate the group (trust has been built) around specific issues.
- Workshop for operating companies and regulators.
- Game on nuclear waste technologies and disposal.

Most players greatly enjoyed the game and benefited from the experience.

"Fun experience - but very intense and tiring."
"Overall, good training experience in 'Let's make a deal.'"

"The games were overall excellent and very helpful to me."

"Interaction was extremely successful because of the geographic 'localness' of the group."

"I enjoyed the game and it was well worth the time. Thanks for bringing the idea and your personal energy to the Environmental Partnership."

"Program was great for me personally to understand the concepts affecting the industry and regulators. I only understood it from my standpoint."

"This exercise has been very trying and taxing, and overall an extraordinary educative and thought-provoking experience. I think these methodologies hold great promise for expansion into hitherto unexplored areas of civilian problem solving. Thank you for all your thought and hard work!"

"I think this process was excellent. It is one of the most creative, productive activities I've had the privilege to participate in.

"Well thought out, interesting participants and setup. Personally, a valuable learning, replicating in some ways a situation my organization is actually working on.

"Great exercise and practice in the art of negotiation."

"It was very educational."

"Thanks for an exciting and challenging experience."

"It was a wonderful learning experience for me. A well-balanced game."

"I think the preparation and content were excellent. I'd like to give up my job and work in this environment. Let's take the game to real life!"

"Excellent simulation of real world problems and interactions with people. Overall concept is excellent. Sandia facilitators/analysts/recorders were great! Overall I applaud the games and their intent. I'm glad I participated. Would recommend to others at EPA."

"I enjoyed the game and felt it was an excellent opportunity to network. I personally learned a lot about the entire process of site remediation, especially the effort required to overcome the regulatory process."

"It's great to see adults incorporate fun into their work and learning process. I really enjoyed the bonding process; this is missing in the work world."

ACKNOWLEDGMENTS

Funding for the Environmental Prosperity Game development and execution was provided by the US Department of Energy

(through its National Laboratories) as part of its missions in energy and environment, and to promote international competitiveness.

The Environmental Partnership of Joint Venture: Silicon Valley Network was a sponsor and strong supporter of this Prosperity Game. In particular, Susan Barich, the Associate Director of the Environmental Partnership, was a major motivator and contributor to the success of the game. Alan Bennett first suggested the idea of an Environmental Prosperity Game in California.

Pacific Gas and Electric Company graciously donated their superb learning facilities to conduct this game, and provided the food and refreshments.

Jennifer Hernandez, Gene Herson, Darcelle Mattson, Susan Barich, Taz Bramlette, Alan Mode, and Kersti Bronk comprised the Executive Committee which helped plan this event.

Staff from Sandia National Labs in New Mexico and California, Lawrence Livermore National Laboratory, and Innovative Futures Corporation provided outstanding facilitation for the game and analyses of the results. Cheryl Mitchell and Kristi Savage handled all the logistics. Gary Sycalik, Susan Barich, Ted Wheelis, and Robert Post did extensive environmental research to help develop the game scenarios.

Seventy players and twenty-nine staff committed themselves to the success of this game, and their efforts are greatly appreciated.

This game is dedicated to the memory of a friend and colleague, Calvin Threadgill, vice president of marketing for Zapit Technologies, who was struck and killed by a car while crossing the Embarcadero in San Francisco in 1994. Calvin was a strong supporter of this game, and participated in the first Executive Committee meetings.

APPENDIX A: LIST OF PLAYERS AND STAFF

NAME	TITLE & CO.	ADDRESS	PH/FAX	TEAM
Blue-1: RESTORE				
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APPENDIX B: GAME SCHEDULE

Wednesday, March 29, 1995

- 5:00 pm Participant registration and badging at Learning Center registration counter; collect materials.
- 5:30 pm Players gather in Conference Center, J-101/102; get acquainted with team members; go to assigned tables.
- 6:00 pm Welcome: Silicon Valley Environmental Partnership-Ted Briggs
- 6:15 pm Dinner with your team members.
- 7:00 pm Prosperity Game briefing/overview with questions and answers; Innovator polling (Marshall Berman -- Game Director)
- 8:00 pm Formal meeting adjourned. Private team meetings and inter-team negotiations may begin. Green Teams may begin to develop their list of "requirements."

Thursday, March 30, 1995

- 7:30 am Continental Breakfast in Conference Center

SESSION 1 - March 30, 1995:

- 8:00 am Welcome: Joint Venture Silicon Valley Network - Becky Morgan
- 8:15 am Players go to assigned tables.
Control Team provides appointment schedules for Blue Team presentations to Green Teams in Sessions 2-5.
Facilitators lead teams in initial assignments:
Blue, Green, Purple, Yellow Teams: Define member roles and responsibilities. Develop plans and strategies; make appointments with other teams; preliminary negotiations.
Green Teams: Define member roles and responsibilities. Green-R must divide into separate regulatory agencies representing national, state, and regional agencies. Green-E and Green-P: Determine no more than two requirements for each Blue Team; Green-R: Determine three requirements from three **different** regulatory agencies for each Blue Team; prepare written descriptions.
Red-Media Team: Dispatch reporters as desired; start on first news release.
Red-Judicial/Legal Team: Determine roles. Develop a policy paper on ways to improve the environmental litigation process. Develop a process to avoid conflicts of interest if suits are filed. Begin offering your legal services to any team wanting them; set realistic prices.

Red-Legislative Team: Determine roles. Begin debate on legislative bills in hopper. Amend bills or present new.

Red-Financial Team: Decide on member's roles (banker, venture capitalist, etc.). Discuss innovative methods for financing projects. Begin meetings with Blue Teams to discuss investments.

Yellow Team: Decide on roles, groundrules, services to be provided and reasonable costs. Divide up tasks and begin play.

Purple Team: Elect mayors for San Manuel and Grimesville, and other officials as desired. Select CEO for Urban Sprawl Development Corporation. Decide on representatives for other potential customers of the four Blue Teams. Discuss division of available funds.

- 9:30 am **Green Teams provide written requirements for Control Team to distribute.**
- 9:45 am **Requirements delivered and posted.** Blue Teams prepare their first presentations; continue negotiations; prepare written contracts where appropriate. All other teams: develop strategies; plan negotiations and contracts; collect information.
- 10:30 am Break. Coffee, tea, soda in Gallery.
- SESSION 2 - January 1, 1996:
- 10:45 am Karma Kards distributed to Blue and Green Teams.
Assess current status (January, 1996).
- 10:55 am Blue Teams make first presentations to assigned Green Teams as scheduled and continue to prepare subsequent presentations for other Green Teams.
Negotiations continue; new agreements and activities pursued.
All teams: inform Control of pending lawsuits to schedule court times.
All teams select a player who will present the teams' results and analysis in the closing session. **Provide names to Control.**
Lawsuits, legislative hearings, etc. proceed all day as needed.
- 12:00 pm Buffet Lunch
- 12:15 pm TV/Radio news broadcast No. 1 (3 minutes)
- 12:45 pm Continue Session 2.
- SESSION 3 - January 1, 1997:
- 1:30 pm Karma Kards distributed to Blue and Green Teams.
Assess current status (January, 1997).

1:40 pm Blue Teams make second presentations to assigned Green Teams; from this point on, the meetings should be scheduled by the Blue and Green teams themselves. Continue to prepare subsequent presentations to other Green Teams. Negotiations continue; new agreements and activities pursued.
All teams: inform Control of pending lawsuits to schedule court times.

SESSION 4 - January 1, 1998:

2:45 pm Karma Kards distributed to Blue and Green Teams.
Assess current status (January, 1998).

2:55 pm **Teams deliver suggested topics for National Environmental Summit Meeting to Control team. Select delegates to the Summit to represent each team.**
Blue Teams make third presentations to assigned Green Teams; continue to prepare subsequent presentations to other Green Teams.
Negotiations continue; new agreements and activities pursued.
All teams: inform Control of pending lawsuits to schedule court times.

4:00 pm TV/Radio news broadcast No. 2 (2 minutes)

4:05 pm **National Environmental Summit Meeting.**

5:00 pm Innovator Poll - Marshall Berman

5:10 pm End of Session 4 and Day's Activities

5:30 pm Beer and Wine Reception in Gallery

6:00 pm Banquet Dinner in Conference Center

6:45 pm Dinner Speaker: Felicia Marcus: "Challenges and Joys of Collaboration: Calling On Our Better Angels" - Introduction by Susan Barich

7:45 pm Adjourn

Friday, March 31, 1995

7:30 am Continental Breakfast. Players go to assigned tables.

SESSION 5 - January 1, 1999:

8:00 am Karma Kards distributed to Blue Teams only.
Assess current status (January, 1999).

8:10 am Blue Teams make fourth presentations to assigned Green Teams; prepare subsequent presentations for revisiting those Green Teams that have not granted certifications for all requirements; schedule revisits to those teams. Negotiations continue; new agreements and activities pursued.
All teams: inform Control of pending lawsuits to schedule court times.

10:00 am Break.

10:15 am TV/Radio news broadcast No. 3 (2 minutes).

10:30 am **SESSION 6 - January 1, 2000:**
Assess current status (January, 2000).

10:40 am Blue Teams revisit Green Teams for additional presentations as needed. Negotiations continue; new agreements and activities pursued.
All teams: inform Control of pending lawsuits to schedule court times.

12:00 pm Lunch

12:45 pm Schedule and complete all presentations, lawsuits, legislative requests, etc.

1:30 pm **Play ceases; status of all teams and negotiations delivered to Control. Teams prepare viewgraphs for final debriefing.**

2:00 pm Final TV/Radio news broadcast (5 minutes).

2:05 pm **Plenary Session: Designated players from every team present their observations and analyses (7-10 minutes each).**

4:30 pm Final briefing and analysis; final scores. Final Innovator Polling.

5:00 pm Game adjourned

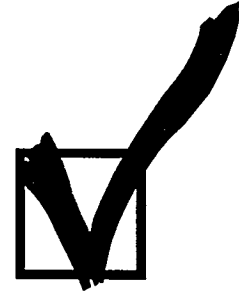
APPENDIX C: SAMPLE BALANCE SHEET

BLUE TEAM - SAMPLE ENTREPRENEURIAL BALANCE SHEET						
Session	Description of Transaction	Requirements overcome	Debt	Debit	Credit	Balance
				Millions	Millions	Millions
1	Initial Funds					\$10.00
1	Contract with Yellow (lab) for product testing; product fails			\$1.20		\$8.80
2	Grant from Purple (customer) for further development	REG-1			\$2.00	\$10.80
2	Karma Kard: Win \$1M				\$1.00	\$11.80
3	File lawsuits on two denied regulatory requirements (win one and lose one)	REG-2		\$2.00		\$9.80
3	Karma Kard: Fined for polluting			\$1.00		\$8.80
3	Contract with Yellow for further product R&D to overcome one requirement	REG-3		\$3.00		\$5.80
4	Seek two arbitrations; lose both			\$1.00		\$4.80
4	Karma Kard: Pay facility damages	PUB-1		\$1.00		\$3.80
5	Environmentalists sue you for ignoring two requirements; you lose both suits	ENV-1		\$2.00		\$1.80
5	Karma Kard: You are fined an additional \$1M			\$1.00		\$0.80
5	Borrow \$10M from bank to stave off bankruptcy; pay 20% interest over game period		\$12.00		\$10.00	\$10.80
5	Purchase additional R&D from Yellow; research is successful			\$1.00		\$9.80
6	File suits on remaining two requirements (win one, lose one)	ENV-2		\$2.00		\$7.80
6	Seek passage of new law to overcome one requirement; succeed	REG-4		\$0.10		\$7.70
6	Karma Kard: Exchange player with regulator team					\$7.70
6	Pass all requirements; Purple makes major purchase of product - \$13M	PUB-2			\$13.00	\$20.70
	Totals =		\$12.00	\$15.30	\$26.00	\$8.70

APPENDIX D: BLUE TEAM BALANCE SHEETS

BLUE TEAM - ENTREPRENEURIAL BALANCE SHEET						
Session	Description of Transaction	Requirements met	Debt	Debit	Credit	Balance
			Millions	Millions	Millions	Millions
1	Initial Funds					\$10
1						
2	Karma Kard:					
2						
3	Karma Kard:					
3						
4	Karma Kard:					
4						
5	Karma Kard:					
5						
6	Karma Kard:					
6						
	Totals =		\$0	\$0	\$0	\$10

APPENDIX E: REQUIREMENT FORM



REQUIREMENT COMPLETION FORM

THE FOLLOWING REQUIREMENT WAS ESTABLISHED BY GREEN TEAM _____
FOR BLUE TEAM _____:

BLUE TEAM PRESENTATION IN RESPONSE TO REQUIREMENT NO. ____:

Requirement ☐ Passed ☐ Did not pass

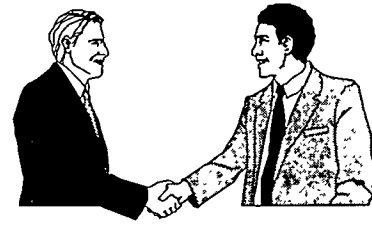
Signed--Designated Blue Team Member _____ Time _____ Signed--Designated Green Team Member _____ Time _____

Received by: _____
Control Team _____ Date _____ Time _____

APPENDIX F: AGREEMENT FORM



AGREEMENT



THE FOLLOWING TERMS AND CONDITIONS HAVE BEEN NEGOTIATED AND AGREED TO BY:

NAME OF TEAM & _____
NAME OF TEAM

NAME OF TEAM & _____
NAME OF TEAM

ON _____
DATE

THE TERMS AND CONDITIONS OF THIS AGREEMENT ARE AS FOLLOWS:

Funds of \$ _____ transferred to _____ from _____

Investment was ☐ Successful ☐ Unsuccessful

Signed--Designated Team Member _____ Time _____ Signed--Designated Team Member _____ Time _____

Signed--Designated Team Member _____ Time _____ Signed--Designated Team Member _____ Time _____

Received by: _____
Control Team Date _____ Time _____

APPENDIX G: BUSINESS PLAN TO ASSIST NEGOTIATIONS WITH FINANCE TEAM

Proposed Investment: Description and total cost of investment. Amount of total cost to be borrowed.

Justification: Provide a justification for the investment, including how risk has been addressed. Benefits to the company? How it fits into the total corporate strategy? Why will this investment be successful?

Proposal to Finance Team: Estimate the total investment and sources of funding required to accomplish the above objectives.

Bank loan (Finance Team)	\$
Venture capital (Finance)	\$
Internal company financing	\$
Total estimated cost of investment	\$

Estimated Income From Investment: Show the **incremental** effect of the investment on the income statement of the company. Variable costs include all other; e.g., labor, materials, depreciation.

	1996	1997	1998	1999	2000
Gross revenue from investment					
Interest on bank loan (if any)					
Variable costs					
Taxes					
Net income after taxes					

Additional Comments:

APPENDIX H: AGREEMENTS AND CONTRACTS

						SUCCESS/FAILURE CALCULATION AS A FUNCTION OF TOTAL DOLLARS INVESTED			
						Assume standard deviation = 0.5 x mean (50%) investment			
Description of Contract/Agreement	"Customer" (Payer) Team	"Supplier" Team	Time	Total funds invested (\$M)	\$M for 50% Proba -bility	Proba -bility	Success or failure		
Base turned over to city; preferential lease rates; DoD-city team to expedite reg. process = "1-stop process"; DoD responsible for cleanup; city to get royalty for products; training program for local high school; preference for local and minority hiring; relocation of plant site negotiable. \$10,000 retainer for services of Jennifer Hernandez	Restore	Purple: City of San Manuel/DoD	9:24 AM 3/30/95						
Purpose of building a pilot (\$100K) and \$100K for other costs; etc.	ROCAR	Red-J/L: Hernandez	9:36 AM 3/30/95						
Exceptions/variances at San Manuel AFB; favorable lease terms; full disclosure of tech results findings, etc.	ROCAR: Big Oil	ROCAR: Clohi	9:40 AM 3/30/95	\$0.200					
Representation before Regulators and litigation related to clean-up of site in Grimesville	Purple: DoD	CUTS	9:48 AM 3/30/95	\$0.200					
Assist with drafting response to Green-Public	CUTS: Behemoth	Red J/L: Hays	9:50 AM 3/30/95						
Handle permitting issues; agreement with Cal/EPA this is ok'd demo site; has approached Fed Regulators; etc.	Babco	Red-J/L: Hernandez	10:13 AM 3/30/95	\$0.005					
Blue 2 contract with Yellow for risk assessment of plant construction methods and technology. Analyze overall performance; 6 month time scale.	CUTS: Electra	Purple: DoD & City	10:35 AM 3/30/95						
Blue 2 contract with Yellow to develop a 200-mile battery within 6 months. Yellow gets 10% of net profits from sales of new battery. Blue 2 has exclusive rights to technology	Babco	Yellow	10:40 AM 3/30/95	\$0.375	\$0.125	1,000	Success		
Blue 2 contract with Yellow to develop a 200-mile battery within 6 months. Yellow gets 10% of net profits from sales of new battery. Blue 2 has exclusive rights to technology	Babco	Yellow	10:45 AM 3/30/95	\$1,500	\$0.700	1,000	Success		
Provide draft of contract for formation of advisory panel to review activities undertaken by DoD, Restore, City of San Manuel.	Purple: DoD /City of San Manuel	Red-J/L: John Lee	10:50 AM 3/30/95	\$0.005					

V. Hoehne will represent Green Public team on the issue of the recall of the Grimesville mayor	Green-P	Red-J/L: Hoehne	11:00 AM 3/30/95	\$0.010			
SYP agrees to perform an assessment of Urban Sprawl property for likely contamination types and levels.	Purple: Urban Sprawl	Yellow: SYP, Inc.	11:45 AM 3/30/95	\$0.200			
Refund?	Red-J/L	Green-P	12:00 PM 3/30/95	\$0.005			
For 5% equity position, \$1M is paid to Electra by Behemoth	CUTS: Behemoth	CUTS: Electra	12:03 PM 3/30/95	\$1.000			
Behemoth grants Grimesville 5% of B's shares; in exchange GOD agrees that once B has demonstrated the feasibility of its cleanup tech, GOD and its members shall provide "blanket regulatory support" for the cleanup operations.	CUTS: Behemoth	Green-P: Grimesville Organiz. for Development	12:12 PM 3/30/95				
Electra contracts with Yellow for independent testing of ET remediation process, to level required by Fed and State regulators	CUTS: Electra	Yellow	12:30 PM 3/30/95	\$0.200	\$0.100	0.977	Success
Site will be moved; all trucks to use 101 routed around base; Restore to utilize a transfer station provided by the city.	Restore	Purple: DoD; Mayor of San Manuel	12:55 PM 3/30/95				
Restore agrees their trucks will not travel on 101 at rush hours	Restore	Yellow	12:56 PM 3/30/95	\$1.000	\$0.500	0.977	Success
Yellow will perform a site characterization for AFB landfill. Blue 1 is paying for a result that the site is determined to be acceptable.							
Parties agree on new site for landfill developed by Restore; located on N edge of base off 101 upon transfer of base to city.	Purple: DoD/DOE	Purple: San Manuel	1:04 PM 3/30/95				
To assist and facilitate the development of the Greening of Grimesville Advisory Committee; etc.	Purple: Mayor	Yellow: SYP	1:05 PM 3/30/95				
Berman Surety reviewed B's B/S and agreed to underwrite the performance of \$8M for a premium of \$400,000	CUTS: Behemoth	Control	1:08 PM 3/30/95	\$0.400			
Behemoth contracts with Yellow for preliminary site assessment. Desired result is that there is no contamination. Failed.	CUTS: Behemoth	Yellow	1:35 PM 3/30/95	\$0.100	\$0.075	0.748	Fail
Babco agrees to sell Nirvana batteries to GMC/Ford per agreement and payment schedule; etc.	Babco	Purple: GMC	1:38 PM 3/30/95				
Regulators contract with Yellow to certify its laboratory for testing (i.e. that they give correct results)	Green-R	Yellow	1:40 PM 3/30/95	\$0.010	\$0.004	0.995	Success
State matching grant funds to leverage fed. monies for Grimesville Sustainable Educ. Program; etc.	Legislature	Purple: Grimesville	1:48 PM 3/30/95	\$0.400			
Believe CAL DTSC Reg. will make unscrupulous deals on permits. US agrees to participate in "sting" operation to remove reg.	Red-J/L: FBI John Lee	Purple: Urban Sprawl	2:03 PM 3/30/95				

\$1M from DOC/Legislat. to provide one-for-one fed matching funds for Grimesville Sustainable Educ. Program; etc.	Legislature	Purple: Grimesville	2:03 PM 3/30/95	\$1,000			
City to indemnify Restore against current/future cleanup costs of DoD site; city to agree to 20-yr agrmt to the exclusive right to the waste generated by the city.	Purple: San Manuel	Restore	2:13 PM 3/30/95				
Restore contracts with Yellow to evaluate performance of liner on bench scale test, appx. 3 months	Restore	Yellow	2:14 PM 3/30/95	\$0.150	\$0.075	0.977	Success
Blue 3 contracts with Yellow to construct small scale lab model to demo ROCAR VOC treatment technology. Also an analytical model and verification on 8 month time frame.	ROCAR	Yellow	2:30 PM 3/30/95	\$1,000	\$0.500	0.977	Success
IRS lawyer	Control	Red-J/L: John Lee	2:30 PM 3/30/95	\$0.100			
DoD, City of San Manuel and Restore agree to formation of independent advisory committee re: construction of landfill; etc.	Purple: DoD, San Manuel	Restore	2:34 PM 3/30/95				
Purple will facilitate all req'd permits for demonstration at base; if successful, Purple will negotiate an agreement with Blue 4 to provide turnkey remediation of entire base; CUTS will pay Purple 20% of royalty revenues until grants by Purple are repaid; etc.	CUTS	Purple	2:34 PM 3/30/95				
Blue 4 contract for ground water field test.	CUTS	Yellow	2:40 PM 3/30/95	\$0.050	\$0.025	0.977	Success
Behemoth contracts with Yellow for site assessment; feasibility study, plan for remediation; etc., etc.	CUTS: Behemoth	Yellow	2:50 PM 3/30/95	\$1,400	\$0.700	0.977	Success
25% of new union entrants will be God Foundation approved minorities.	Green-P: Labor	Green-P: Minority	2:58 PM 3/30/95				
Gary Motors Co. contracts with Clohi for clean air demonstration project with Clohi exhaust system, etc.	Purple: GMC	ROCAR: Clohi	3:00 PM 3/30/95	\$0.100	\$0.050	0.977	Success
Participate on Mayor of Grimesville Committee; Babco provides 5% after tax profits to GOD Fdn, God Fdn will designate and use funds to train citizens to work at Babco, etc., etc.	Babco, Yellow, Green-E	Purple: Grimesville; Green-P	3:02 PM 3/30/95	5% ATP			
As part of any sale agrmt for Behemoth property to Urban Sprawl, Ur. Sp. will provide an EIS. Behemoth will remediate all property to residential use levels.	Purple: Urban Sprawl	CUTS: Behemoth	3:05 PM 3/30/95				
DoD allows excl. use on 50 acres at the AFB for 5 yrs. subj. to approval of city of San Manuel. Site will be used by SYP to establish a tech/demonstration/verification center. SYP to provide \$100,000 (one-time) donation to San Manuel	Yellow: SYP	Purple: DoD	3:06 PM 3/30/95				

DoD/Restore/San Manuel contracts with SYP (Yellow) for evaluation of landfill remediation design	Purple: DoD/ San Manuel; Restore	Yellow	3:08 PM	\$0.150	\$0.075	0.977	Success
Big Oil acquires outstanding public stock of Clohi for \$3/share prior to injection of new funds by Big Oil and Finance	ROCAR: Big Oil	ROCAR: Clohi	3:10 PM 3/30/95				
Blue 3 contracts with Yellow to sample and analyze for VOC, Tox, NOx, CO, etc.	ROCAR	Yellow	3:15 PM 3/30/95	\$0.056	\$0.028	0.977	Success
Financial Services to Babco for developing funding	Babco	Finance: Oliveros & Associates	3:26 PM 3/30/95	\$0.100			
Behemoth agrees to pay \$100,000 to be bonded for \$1M as a perf. bond for cleanup of Grimesville Site., etc.	CUTS	Control	3:30 PM 3/30/95				
Due to ongoing proj. constraints & non-complete agrmts signed by Mr. Boissiere, the transfer of Mr. B will be delayed for 5 yrs	CUTS	Green-R	3:52 PM 3/30/95				
Restore hires all union truckers to drive their trucks for landfill	Restore	Green-P	4:00 PM 3/30/95	\$0.005			
Production of Nirvana II battery by GAW for 3 yrs, rate of \$25,000; GAW receives excl. right to European mkt., etc.	Babco	Purple: Ger. Auto Work	4:05 PM 3/30/95				
\$5M equity invt. in Big Oil's buyout of Clohi. Roadrunner Fin. Ptnrs will own 11% of new entity and have 2 board seats	Finance: Roadrunner	ROCAR: Big Oil	4:22 PM 3/30/95	\$5.000			
Restore will comply with Subtitle D reqmts by providing this corporate guarantee for \$2M	Restore	Green-R: Fed Regs.	8:22 AM 3/31/95				
Ur. Sp. agrees to purchase 2 Behemoth plots for \$10M, Behemoth agrees to complete remediation by 2000 of both sites and retain liability for any residual contamination. Down payment of \$500,000 paid to Behemoth.	Purple: Urban Sprawl	CUTS: Behemoth	8:23 AM 3/31/95	\$0.500			
Green-P sues Big Oil for anti-trust violation, \$5 billion in damages; paid \$1M in court costs	Green-P	Red-J/L	8:50 AM 3/31/95	\$1 billion contingen [†]			
Blue 3 contracts with Yellow to increase/extend VOC, Tox Nox, CO test program; etc.	ROCAR	Yellow	8:50 AM 3/31/95	\$0.198	\$0.099	0.978	Success
Pursue FOIA documents, defense of Urban Sprawl	Purple: Urb. Sprawl	Red-J/L: Brechtbill	9:00 AM 3/31/95	\$0.100			
Repeal of tax equity act; proposal has been submitted to Red-L for debate	ROCAR: Big Oil	Legislature	9:07 AM 3/31/95	\$0.100			
Begin characterization and remedial activities on railroad right-of-way; Electra will work with Yellow Team	Purple: DOT	CUTS: ET	9:11 AM 3/31/95	\$0.200			

RFP extends to Restore \$12M line of credit. Initial cost \$120,000 + interest of 1 pt. over prime on borrowed funds	Finance: Roadrunner	Restore	9:12 AM 3/31/95	\$0.120		
Amendment: Parties agree to cut price stated by 10% effective immediately. Agree in consideration for reduction that no further cuts will be made in price prior to completion of order in 2003.	Purple: GMC	Babco	9:13 AM 3/31/95			
US Congress passed legislation to repeal the Tax Equity Act and directs IRS to implement tax credits to companies that paid the tax and suspend all efforts to collect unpaid tax	Legislature		9:16 AM 3/31/95			
Legal Counsel	ROCAR: Big Oil	Red-J/L: John Lee	9:16 AM 3/31/95	\$0.100		
Choco Chips Semiconductors to buy 1 concentrator @ \$200,000 & yearly cost of \$240,000; etc.	CUTS: Electra	Purple: Chips Semi-conductor	9:17 AM 3/31/95	\$0.540		
Non-disclosure statement: 5 minutes credit from Karma Kard	Babco	Red-J/L	9:20 AM 3/31/95	No \$; 5 min cred		
Blue 2 contracts with Yellow for an assessment of S&H plans, emergency, waste analysis plans, etc.	Babco	Yellow	9:25 AM 3/31/95	\$0.110	\$0.055	0.977 Success
Amend agreement	Babco	Red-J/L	9:30 AM 3/31/95	\$0.001 owed		
Red-J/L being retained to lobby legislature on certification bill	Green-E	Red-J/L	9:31 AM 3/31/95	\$0.020		
For introduction of HRS to secure funding for Babco in the development of their industry in the USA; etc.	Babco	Legislature	9:33 AM 3/31/95	\$0.100		
Finance establishes joint line of credit for small business in San Manuel to meet Community Reinvestment Act requirements; etc.	Purple: San Manuel	Finance	9:33 AM 3/31/95			
Electra agrees to allow Green-E to select 1 acre test site, engage consultant, further clean up to proceed after consultation; etc.	CUTS: Electra	Green-E	9:34 AM 3/31/95			
Blue 4 contracts with Yellow to do site assessment on Site 1, see map. This is to calculate a number between 0 and 1, with 0.5 at ND. Above that remediation will be necessary.	CUTS	Yellow	9:40 AM 3/31/95	\$0.100		0.622
Behemoth contracts with Yellow to determine extent of contamination already identified.	CUTS: Behemoth	Yellow	10:10 AM 3/31/95	\$0.100		0.831
ET/CUTS establishes training course in ET cleanup tech. for 30 trainees at San Manuel AFB. SMAFB pays ET \$100K. Etc.	Purple: San Manuel AFB	CUTS: ET	10:15 AM 3/31/95	\$0.100		
Restore contracts with Yellow to evaluate performance in a field test of whole landfill system and evaluate appropriateness of Grimesville site for the landfill.	Restore	Yellow	10:20 AM 3/31/95	\$1.000	\$0.500	0.977 Success

Land dollar assessment at railroad easement Section I is \$125,000/acre for 75 acres = \$13.1M (\$0.9375M)	CUTS	Finance: Bank	10:20 AM 3/31/95			
SYP to complete prototype model of NO _x free diesel engine, 97% prob of success; etc.	Yellow: SYP	Finance: Roadrunner	10:27 AM 3/31/95			
Roadrunner Financial Partners to exclusively license GMC for its no-NO _x diesel engine tech. For GMC trucks; etc.	Purple: GMC	Finance: Roadrunner	10:27 AM 3/31/95			
Underwriting agrmt - 2m shares at \$6/share = \$12M less 6% fee = \$11.28M.	Babco	Finance: Merrill&Shark	10:29 AM 3/31/95			
Consultant for 1999 & 2000 and stock options to lend	Babco	Yellow: Len Hiles	10:29 AM 3/31/95	\$0.250		
Financial services for 1999 & 2000	Babco	Finance	10:29 AM 3/31/95	\$0.200		
Restore requests \$8M from RFP for San Manuel landfill project.	Finance: Roadrunner	Restore	10:36 AM 3/31/95	\$8.000		
DOE to San Manuel \$500,000 grant to fund Economic Development Diversification Study focused on technology to assist DOE in tech. Transfer within the region.	Purple: DOE	Purple: San Manuel	10:36 AM 3/31/95	\$0.500		
CUTS to establish a \$100,000 research contribution to support R&D of SYP; etc.	CUTS	Yellow: SYP	10:52 AM 3/31/95	\$0.100		
Blue 4 contracts with Yellow to develop engine modification to improve fuel efficiency and reduce emissions; etc.	CUTS: Behemoth	Yellow	10:54 AM 3/31/95	\$2.000	\$1.000	0.977 Success
Services rendered	ROCAR: Big Oil	Red-J/L	10:55 AM 3/31/95	\$0.100		
Blue 4 contracts with Yellow to verify that clean-up is good enough. Part one of a two part agreement.	CUTS: Behemoth	Yellow	10:58 AM 3/31/95	\$0.040	\$0.020	0.977 Success
Part two of above agreement, clean closure of land.	CUTS: Behemoth	Yellow	11:00 AM 3/31/95	\$0.100	\$0.050	0.977 Success
Sale of 2 acres of property @ \$175,000/acre; sale complete upon cleanup of Sec. I. \$100,000 paid up front; etc.	Purple	CUTS: Electra	11:04 AM 3/31/95	\$0.300		
MOU between EPA & CAI/EPA to foster a one-stop permitting process. Etc.	Green-R: Feds	Green-R: State & Local	11:05 AM 3/31/95			
Agmt/ to manufacture of 3 units at \$600K each according to the following schedule: unit 1 - 90 days; unit 2 - 120 days; unit 3 - 150 days. Manufacturing to take place in the US.	ROCAR: Big Oil	Finance: Singapore Sling	11:07 AM 3/31/95	\$1.800		
Red J/L to neg. agmt on San Manuel AFB open space. "Successful " means 600 acres with setback from river/ocean; etc.	Green-E	Red-J/L	11:17 AM 3/31/95			
Marketing of Clohi tech to oil companies; Set up sales force (reps).	ROCAR: Big Oil	ROCAR: Clohi	11:18 AM 3/31/95	\$0.250	Jor. Lopez	

Greensville to provide facility for ET/CUTS to train 30 workers in ET cleanup tech.	Purple: Greensville	CUTS: ET	11:19 AM 3/31/95			
Urban Sprawl to contribute \$100,000 to election campaign of Gary Nolan; no strings attached. Etc.	Purple: Urban Sprawl	Green-R: Gary Nolan	11:20 AM 3/31/95	\$0.100		
\$1.7 phase I cleanup of railroad easement. Site has been assessed to contain 20% contamination of VOC; etc.	Purple: DOT	CUTS: ET	11:21 AM 3/31/95	\$1.700		
Bank line of credit to Electra. Total borrowing not to exceed \$5M. Interest at prime+2%. Etc.	Finance	CUTS: ET	11:26 AM 3/31/95			
\$3M to fund AB 97-1; establish pilot certification center at San Manuel military facility; etc.	Legislature: California	Green-R: Cal EPA	11:27 AM 3/31/95	\$3.000		
De-rail bill HR 1995-1; \$100K from Green-E to	Green-E	Red-J/L	11:32 AM 3/31/95	\$0.100		
Introduce legislation for diesel retrofitting	Finance	Legislature	11:32 AM 3/31/95	\$0.100		
Set aside 542 acres of air force base, acreage to be restored to natural state and managed in perpetuity; trails, bike paths, etc.	Purple: DoD/ San Manuel	Green-E, Green-P	11:40 AM 3/31/95	\$0.250		
Verify efficiency of No-NOX diesel engine for the elimination of No _x . Need 3rd party verification.	Finance	Yellow: Lora Lee Martin	11:44 PM 3/31/95	\$0.050		
4 Clohi thermal units @ \$100K each installed in 2001.	Purple	ROCAR: Clohi	11:45 AM 3/31/95	\$0.400		
Control will authorize 12.1M shares of common stock for Babco; stock to be used as protection against hostile takeover.	Babco	Control	11:45 AM 3/31/95			
Electra & Air Force jointly seek regulatory approval and/or exemption for full scale demonstration of Electra E-Beam tech at the AFB. Etc. Etc. Etc.	CUTS: ET	Green-R, Green-E, Green-P	11:45 AM 3/31/95			
Consultation (Free by Karma Kard)	Yellow	Red J/L	11:48 AM 3/31/95	\$0.010		
Behemoth to contribute \$100K to election campaign of Paul & Gary; no strings attached. Etc.	CUTS: Behemoth	Green-R: Gary, Paul	11:53 AM 3/31/95	\$0.100		
Install 2 ground water monitoring wells, one upstream and one downstream.	Restore	Yellow	11:53 AM 3/31-95	\$0.020		
Cost of ecological testing of cleanup process; Env. team to provide results to Electra.	Green-E	CUTS: Electra	12:00 PM 3/31/95	\$0.050		
Oversight during cleanup testing; no adverse ecological effects of cleanup procedure. 1 acre, 3 months.	Green-E	Yellow	12:00 PM 3/31/95	\$0.050		
Extradition document, freeze assets of 2 Yellow employees.	Yellow	Red-J/L	12:00 PM 3/31/95	\$0.100		

Codicil on previous agmt with Big Oil for mfg. Plant. Plant located as shown on map. Contingent on agmt, purchase 1 acre on fwy.	Finance	Purple: San Manuel	12:00 PM 3/31/95	\$0.200			
\$10M Loan from Fed Res @ 10% per year, deliver by June 2005; payments begin 2001 in 5 installments at \$3M.	Control	Finance	12:04 PM 3/31/95	\$10.000			
DoD to clean up all env. problems at USAFB created by DoD use, incl trace heavy metals etc. VOCs remediated by CUTS.	Purple: DoD	Purple: San Manuel	12:55 PM 3/31/95				
Get Green E amendments added to one-stop permitting bill	Green-E	Red-J/L	1:22 PM 3/31/95	\$0.025 \$0.075			
DoD/CUTS contracts with Yellow to provide technical oversight/ validation/verification of CUTS results, etc.	CUTS, Purple/DoD	Yellow	1:24 PM 3/31/95	\$0.050	\$0.035	0.804	Success
Electra has right of first refusal to clean all VOCs. DoD will pay \$4M, \$1M down, and 3 additional installments.	Purple: DoD/SMAFB	CUTS: Electra	1:25 PM 3/31/95	\$4.000			
\$25M loan for Babco from Control.	Control	Babco	1:26 PM 3/31/95				
ROCAR to contribute \$100K to election campaign of G. Nolan & P. Giardina	ROCAR	Green-R: Gary, Paul	1:29 PM 3/31/95	\$0.100			
Green Oil/Clohi to locate research facility at San Manuel Business Park, etc. \$100K per year to Envirolink.	Big Oil: Clohi	Purple: San Manuel	1:29 PM 3/31/95	\$0.010			
Restore's landfill tech be taken for consideration in YOUT prog for technology certification.	Restore	Green-R	1:29 PM 3/31/95				
Restore to settle fine with EPA /CalEPA at \$400K	Restore	Green-R	1:29 PM 3/31/95	\$0.400			
Contribution to est. Institute of Good Env. Decision Making, etc. \$400K from Restore, \$2M from Yellow	Restore	Yellow	1:29 PM 3/31/95	\$0.400 \$2.000			
Bankers to contribute \$100K to campaign of Gary Nolan & Paul Giardina	Finance	Green-R: Gary, Paul	1:29 PM 3/31/95	\$0.100			
Electra to clean up the northern Urban Sprawl plot contaminated with heavy metal by previous operations.	Purple: Urban Sprawl	CUTS: Electra	1:30 PM 3/31/95	\$0.200			
California Certification for Testing Laboratory	Yellow	Green-R	1:45 PM 3/31/95	\$0.010			
Grand Totals =				\$ 59.14	\$4.716		

Business Park, etc. \$100K per year to EnviroLink.		Manuel	3/31/95				
Restore's landfill tech be taken for consideration in YOUT prog for technology certification.	Restore	Green-R	1:29 PM 3/31/95				
Restore to settle fine with EPA /CalEPA at \$400K	Restore	Green-R	1:29 PM 3/31/95	\$0.400			
Contribution to est. Institute of Good Env. Decision Making, etc. \$400K from Restore, \$2M from Yellow	Restore	Yellow	1:29 PM 3/31/95	\$0.400 \$2.000			
Bankers to contribute \$100K to campaign of Gary Nolan & Paul Giardina	Finance	Green-R: Gary, Paul	1:29 PM 3/31/95	\$0.100			
Electra to clean up the northern Urban Sprawl plot contaminated with heavy metal by previous operations.	Purple: Urban Sprawl	Cuts: Electra	1:30 PM 3/31/95	\$0.200			
California Certification for Testing Laboratory	Yellow	Green-R	1:45 PM 3/31/95	\$0.010			
Grand Totals =				\$ 59.14	\$4.716		

THE PROSPERITY GAMES JOURNAL

Volume VIII, No. 1

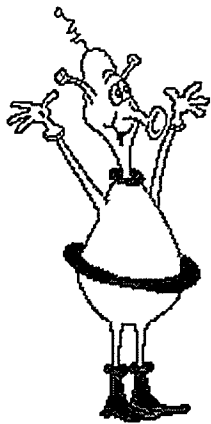
Wednesday, March 29, 1995

San Ramon, California

ET COME HOME!

PG, GRIMESVILLE, CAL.

Several members of the Grimesville community have created a backlash to the environmental community activists opposing Electra Technologies' (ET) efforts for approval of the ET environmental remediation technology - and have produced a radio spot with a jingle entitled "ET COME HOME," composed and sung by local Grimesville Tavern owners and patrons. Johnny O'Johnny, owner of the



tavern, says that he and his customers support their fellow business associates (ET engineers and technicians) who frequent his establishment. The song can often be heard while traveling past the abandoned foundry.

HOT ROCKS!

SAN MANUEL, CAL. —

Oil industry analysts are watching Big Oil's progress in trying to commercialize the new Clohi technology - the process that uses "hot rocks" to destroy volatile organic compounds. Most believe that significant additional financing will be required - perhaps \$10 million. A smaller demonstration unit at the facility might be four or five times cheaper, but would not be as convincing as a full-scale facility.

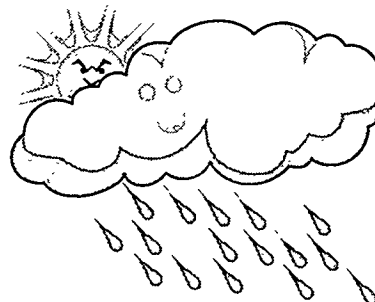
BEHEMOTH STOCK COULD RISE STRONGLY (OR NOT)

NEW YORK — Wall Street wonks believe that Behemoth stock is poised for either a dramatic rise or fall (?) If Behemoth can solve its problems with polluted properties, it's stock could rapidly rise by 25% to \$5 a share. Contrarian wonks have been shorting Behemoth - betting that no progress will be made for years to come. Poly Anna, economist for Ecowonks, believes that Electra's technology is the wave of the future; she predicts a world-wide market of billions of dollars in the 21st century.

RAIN, RAIN, GO AWAY

SAN MANUEL, CAL. —

Forty days and nights of rain have made golf a dangerous sport at the Pebble Cliffs Country Club. "Players can occasionally sink down to their knees in some spots," said club manager Jose Bravado, "but that shouldn't slow down any real golfers. It's just another hazard." The steady rains however are of concern to a local neighborhood association. They believe that the landfill proposed for a site near the Country Club hasn't



accounted for extremely wet soil. They want more information from Restore, Inc., the company petitioning to build this landfill.

Advertisement

**Support BABCO! Your
Bay Area Battery
Company,
Designer of the
Factory of the Future.**

THE PROSPERITY GAMES JOURNAL

Volume VIII, No. 2

Friday, March 31, 1995

San Ramon, California

BALANCED BUDGET BACKLASH!

Washington, DC --
Congressional passage and
presidential support of the
Balanced Budget
Amendment is sending
financial shock waves across
the nation.

President Bill Clinton has
ordered massive federal
spending cuts to comply with
provisions of the legislation.

Mr. Clinton, in a White
House briefing for selected
reporters, said that every area
of federal spending will be
affected. He has ordered
departmental secretaries to
alert all federal facilities of a
20-25% spending cut.

In response, departmental
secretaries say that the
massive cuts will necessitate
layoffs "of considerable size"
and elimination of many
federal spending programs.

University funding programs
and the national laboratories
are two areas expected to be
hardest hit by the Balanced
Budget cutbacks.

HOT FLASHES!

San Manuel, CA --
Journal reporters are
testing the veracity of a
rumor that an on-going love
affair between two key
participants in the San
Manuel County FBI sting
bribery case involving two
country regulators, is
responsible for a judge's
reversal of a guilty verdict in
the case.

The Journal has also learned
that new evidence has
surfaced, through the
Freedom of Information Act,
of federal EPA files that may
substantiate the case against
Urban Sprawl, Inc. and
exonerate the country
regulators.

BOOK REVIEW

**"Games, Strategies and
Managers," 1992, by John
McMillan:**

Selected quotes:
"Game theory is the study of
rational behavior in
situations involving
interdependence.

"A rational decision in a
game must be based on a
prediction of others'
responses. By putting
yourself in the other's shoes

and predicting what action
the other person will choose,
you can decide your own
best action.

"Coping with uncertainty is
an inescapable feature of
decision-making. Decisions
are typically made without
full knowledge of their
consequences.

"Complexity is dealt with by
breaking the situation into its
components."

CONCERNED ABOUT THE COSTS AND DELAYS OF LITIGATION?

CONSIDER AN EFFECTIVE
ALTERNATIVE:

MEDIATION

ADVANTAGES INCLUDE:

- LOWER FILING FEES
- QUICK RESPONSE
- POTENTIAL WIN-WIN
SOLUTION
- PRESERVE
RELATIONSHIPS

INTERESTED? CALL RED
J/L

5-minute free consultation

*This space donated by The
PG Journal, Inc.*

APPENDIX J: TEAMS - DETAILED DESCRIPTIONS, ACTIONS, AND ANALYSES

BLUE TEAM 1 - Restore, Inc.

Chronology and Highlights

1. Team Demographics: Of the six players, five are owners, presidents, or directors of their own company or division. Five of the six are by training environmental experts, while one is on the PR side of selling environmental concepts to the public, and team building around environmental initiatives.

2. Instincts: In opening discussions, the instinct of most teams is to discuss what they are familiar with, i.e. the technical aspects of Restore's plan to build the new landfill, rather than the tactics of getting it started, much less the strategy or longer term goals. Several efforts to get the team to focus first on its long range concept either were "bowed to" then dropped, or led only to gridlock in the initial discussions.

3. Sequence of Discussion: One team member proposed that the team decide strategy and goals, then the maximum budget it would allocate to completion of the proposed San Manuel project, then what "carrots" it had to trade with other players, seeking room for cooperation with other Blue teams to get the demo project up and running. Discussion then quickly went to technical details of building the project. The facilitator asked two questions: (1) Where did the company want to be in five years; and (2) How was it going to organize in order to get there? Discussion then went to goals, but again devolved to how to build, in a technical sense, the demo landfill, and no consensus was reached about goals or about how to organize either as a company or as a team within the game.

4. Goals: Blue-1 decided that its top goal was to get the demo built, albeit not necessarily at the San Manuel site, and to do so within the 5-year time frame, but hopefully within a maximum of 1-2 years (one year minimum to get approval). Riders were to do so in ways that the process of permitting and building the landfill was reusable, not just site-specific, and that steps in the process were clearly understood so that they were repeatable elsewhere. Minority viewpoints were that Restore also have several other orders within the 2-5 year time frame, that it "be profitable" over the 5-year horizon, the San Manuel project notwithstanding, and "to do what is best for the community" (of San Manuel County). The general goal seemed to be to prove the company's new technology by building the demo, and that if that could not be done at the San Manuel site, the option existed of building the demo elsewhere. Before the Team could subvert the game scenario however, Control stopped this line of reasoning and encouraged the team to concentrate first on San Manuel. One team member confirmed this by arguing that politically you had to make a commitment to the site in question, or environmental groups would gladly let you go elsewhere.

5. Organization: Extensive discussions within the group about how to organize itself for events of day 2 led to an initially futile debate about who was to be responsible for what. Beneath the focus on responsibilities were two key issues:

- a. Was a single-team decision process to be used, or would responsibilities be delegated to individuals so that the team could move quickly and nimbly once the flow of play began?
- b. What are the major areas of concern with respect to getting approval to proceed? This backhandedly may lead the team to how to implement its strategy.

6. Issues:

- a. What is Step #2, #3 etc. once permitting/construction of the San Manuel plant is on the way?
- b. What options exist if approval is not forthcoming within some (unspecified) time frame?
- c. How long, and at what cost, should Restore pursue the San Manuel landfill project before moving on to some sort of backup plan if it is not permitting?
- d. What "carrots" — and what points of commonality — exist for dealing with other Blue teams in pursuing a common initiative towards the regulatory and public support process?
- e. Can the team think long-range in terms of overall company philosophy?
- f. Can team members put aside personal experiences ("been there - done that") and get into the game/scenario, and resolve power struggle issues?

7. Observations:

- a. Team is at best at "Level 1".
- b. As a company the group is process-focused, rather than strategy-focused.
- c. Team has not yet jelled as a group; needs to do so before Move #3 or it may be overwhelmed by unfolding events.

Guidelines agreed to:

- (1) Everyone has opportunity to speak
- (2) No Interruptions'
- (3) No side bar conversations
- (4) Decision by majority
- (5) Empowerment subject to guidelines in play
- (6) No overall "boss"/President
- (7) Task orientation vice roles per se
- (8) Use three 2-person teams
 - Public/Environmentalists
 - Regs and Permitting
 - Tech Needs/financial

Issues:

- What is relationship of finance to tech?
- Should there be a "Team president?"

Team strategies

- Indep. verification (odors)
- Avoid getting into DoD clean-up business
- Make deals with other suppliers
- ID and use carrots wherever possible

What carrots?

- Can prolong life of landfill
- Allow community oversight
- Give equity position to community
- Provide audit entity for community
- Willing to relocate on base
- Address odor control problem
- Relocate sewer line
- Develop a back-up in case no permit
- Household hazard waste sequence

0850 - Mtg/Agreement with City and DoD

- DoD and City have reached agmt
- Will turn over site to city
- City will allow preferential lease rates to Restore
- DoD/City team will expedite regulatory process (1-stop shopping)
- DoD will be responsible for base cleanup
- City will get a royalty for Restore products and services
- Restore to install training program for local High School
- Preference to be given to local hires
- Preference to be given to minorities
- Relocation of plant site on base OK

0920 - More discussion on carrots - Issue: Fear of the unknown by the public; 90% of the process is already known, but the public is afraid of the 10% that is new (it will always be so)

0945 - Hooper and Mukesh met with Red-F team on money; no current need due to permitting effort still in process.

0950 - Requirements received; reviewed and delegated them to the various sub-teams to work *[Little in the way of strategy to handle the requirements, mostly an info-gathering approach.]*

1015 - Local legislator announces she is against the current site due to Turkee River, trucks, and sewer line across the #9 green, but also says that 20-yr plan with amenities will help sell it to any other site in town

Issue: Team turns down any idea of moving the site other than on the DoD base. "No other sites, or they'll have you playing musical chairs"

New Issue: Trucks up and down 101 a problem; city wants to minimize from 300 per day to 25 per day.

TEAM MAKES DECISION TO RELOCATE SITE ON THE BASE, AND INSTALL NEW SEWER LINES. Question of where transfer station will go is still outstanding.

1050 - CUTS wants licensing fees

Karma Kard: \$1M to fight challenge to a Restore patent

BLUE #1 again returns to what it can do in concert with other (Blue) entities. Some ideas:

- Develop HS training program re sewage treatment
- Develop testing process for agricultural enhancement/renewal

Note: \$24 million apparently "missing" from Blue #1's balance sheet assets (T-bonds)

1125 - Press release issued stating that Restore has been approached by a European company with an offer to demo the landfill capability at an unspecified site in Europe which will avoid all the regulatory hassles.

1215 - Agreement reached to pay for Site Characterization study to prove efficacy of new site for landfill. \$1M will be expended to ensure the survey comes out positive (97.7%). Agreement reached with Jefferson National Labs to do the survey, but Green-E Team wants to know the credentials of the survey conductor. Issue: Are they really interested, or is this just a stalling tactic?

1230 - "Public" approaches Blue-1 Team member, proposing that Restore enter into an agreement with other Blue companies to contribute to a Non-Profit Economic Growth enterprise to underwrite development in and around the city. They further state that this does not replace other "carrots" they want, but Member figures this is only part of a wider effort by the City/Public to grow, and to get industry to pay for it.

Lunch time Status:

- Green Reg 1: Need more info regarding technical aspects of liner = geologic study
- Green Env 1: Tentatively approved pending Data Review
- Green Reg 3: As long as indemnity waived by city and site is moved, will forego this requirement.
- Green Public 1: New location is OK, but concern expressed about number of trucks on Highway 101 [red herring]
- Green Reg 2: Same as Green Env 2
- Green Env 2: Reliability at issue; solution is to run a joint study by DoD/City/ Restore.

New Issue: City wants 10% off the top, but not necessarily up front. Willing to indemnify us, and will agree to use Restore exclusively for next 20 years. Public, separately wants \$250,000 contribution to economic development.

Discussion re: City demands

- What is city going to use the base for?
- Restore needs indemnity from both city and DoD.
- Company mgmt needs to think about financial aspects to company before negotiating with city any further on economic development package. Issue: equity (where city shares in risks and gains) vs. up front

1305: Amended agreement with City and DoD.

- Site will be moved to NNE on base
- All trucks to use 101, routed around base using farthest north freeway exit.
- Restore agrees to utilize a transfer station provided by the city in order to limit traffic on route 101 to 25 trucks per day.
- Restore agrees that their trucks will not travel on route 101 between 5 PM and 8 AM.

Summary observations at this point:

Team is still focusing on details of each next problem, and as a result is being whipsawed by every new and emerging idea being dreamed up by the City, and the Public. Cause is that they set their initial goals short-ranged. Players are still relatively enthusiastic and supportive of the game process. For this particular group this seems to be more a product of the group itself than the lack of time initially available.

1325 - It is being noted that environmentalists are tying up everything by varying and competing demands. Proposal is made to make an agreement with the suppliers to show how the BAD technology and liner technology will succeed in satisfying regulatory requirements. But one member says it is time to consider how much is being given away up front.

New requirement from Green - Environmentalists: No hazardous waste may be introduced to the landfill, and no waste may be brought in from outside of county. Team sentiments starts to grow against proceeding with the project at all.

2nd Karma Kard: \$10,000 worth of legal fees. Team decides to use the value to have lawyers check out the new requirement from the Green - Environmentalist team.

At 1325, Hooper and Ajuda return from long discussion of company finances, and want to initiate a discussion re strategy pertaining to "what is being given away". However, their initiative is quickly overtaken by events, e.g., new requirement from Green-E and Karma Kard.

1340: Financial review. How much are we promising up front (and in view of the fact that Restore would only break even on the project in the first place).

Current balance is now \$8,005,000.

- Bugs to sell (license)
- At some point, the stuff you give away in order to get the facility up and on line will put you into a hole.

- Conversation resumed at 1415:
- Offer equity to municipalities ca. 10%

Summary of what has been passed:

- (1) Site relocation (G-Pub 2)
- (2) Site study (G-Env-1)
- (3) State regulator requirement BAD technology proven (G-Reg 2)
- (4) Indemnity guaranteed (G-Reg 3)

[Break-in announcement: All companies taxed \$5,000,000 for new welfare programs].

Team makes decision to write a check to deduct the \$5M from corporate, vice project, balance sheet, and that it would be a waste of time and effort to "take it to court". **Clearly the timetable for achievement of original goal is at work here, and implicit decision is that it is worth \$5M to avoid wasting time at this point in the game.**

1400 - Discussion re city request:

- City wants Restore to support economic development.
- Financial officers want to turn it down.
- But Bruce says to look at it as Restore's chance to be more participatory, and build a process which can be taken elsewhere.

- Finance officers want to give them 10% (1M shares) geared toward economic development.

Argument is that there will be no loss on this particular project since it is not projected to make money anyway, and in future the income stream will be positive once this demo is up and running.

- Need to map the contribution to economic development package.

[Hooper's view is that if you can sell the locals you have no problems with the Feds]

[Atwood's view: "They haven't asked yet; don't worry about it"]

- The \$1.6M that was a set-aside now does not have to be spent, since it was for land procurement -- no adjustment made to the books.

- Debate: It is to Restore's advantage to have the city involved financially (in case of odors, too many trucks, etc.), vs. the outlook that we are giving away too much to the City in the first place.

[Observation: The city started out appearing to be the best friend of Restore, but has been "nibbling them to death" ever since by asking gradually for more and more. Now, the city appears to be the #1 stumbling block to approval of the entire project. Also, the Team is speaking in business terms about what they will offer to the city; but the city does not want share of the company, it wants investment up front in local infrastructure.]

Counter offer to city:

- (1) 1,000,000 shares in Restore
- (2) Annual dividends of about \$250K
- (3) Preferential hiring for locals (to offset unemployment problem)
- (4) Low business turnover (20 yr commitment)
- (5) \$50,000 of in-kind services annually
- (6) \$50,000 short term in job-training, summer jobs, and controlled growth
- (7) Tax incentives

(8) Odor

Revisit discussion of \$5M national tax:

- There is no point in filing suit vs. US Congress. Pay the \$5M.

1450: Karma Kard #3: One proxy vote in Blue-1 team's favor on Green Environment team's vote. Discussion ensued whether to use it to guarantee passage of approval of the liner technology proof, but team member (Dan) said he would not need it. Decision: Hold it in case needed tomorrow.

1515: Current status:

- *Mayor is meeting with local groups about their stipulation that they want no out-of-county waste brought in to the new site (Green-Env 3)*
- *Local regulators need to approve the liner solution, but are currently in jail and cannot be dealt with directly. (Attempt to use the one Karma Kard proxy vote not approved) Green-Reg 1)*
- *Meeting pending with Fed Regulators to discuss company guarantees in lieu of \$8M bond posted. (G Reg 3)*
- *Arrangement for consortium to set up pool of money for environmentalists to hire independent experts to evaluate the new Restore technology as it is installed is pending acceptance from environmentalist group. (G Env 2)*

1525: G Reg 1 approved.

1535: Report from Mayor meeting with environmentalists:

- No waste from outside of county, and that is firm.
- If amount of waste should subside, the revenue stream could dwindle, and Restore would be left holding the bag.

- Options

- (1) Have a study made of revenue stream over the next 20 years.
- (2) Or lawsuit vs. environmentalists for restricting trade.
- (3) Buckle under (we're in for a demo, so keep to the point).

- Discussion:

- Restore doesn't need their permission.
- They cannot stop Restore.
- Real world suits have normally been resolved in favor of free passage.

1550: New Karma Kard levied by Green EPA: "No odors, whatsoever". Readdressed issue to Regulatory Gn - Fed, but was told to "Take it to court".

1610: City (jobs, et al) approved. G PUB 1

Reliability consortium satisfied G ENV 2

Day-end status: of 7 RQMTS originally rcvd, 6 have been passed; only one outstanding is the financial assurance requirement. However, 2 more have been added through course of the day. 1/2

of one (haz. waste - G ENV 3), has been satisfied, but no out-of-county waste has held firm. The other new one pertaining to no odors remains open. (Intent is to file suit tomorrow).

March 31, 1995

0800 - Karma Kard drawn: \$1M in credit @ National Labs

0810 - Status summary

- \$3.445 M in entrepreneurial balance sheet, following Karma Kard addition (\$1M earmarked)
- 2 1/2 RQMTS yet to be satisfied, all are under consideration by Green Regulator teams.
- Mark Hooper selected as PM spokesman
- All 6 team members still present
- Attitude still positive, but all a bit jaded (off the cuff/tongue in cheek) at this point

0815 - Team Rep off searching up new customers

- Ms. Atwood "bribed" into being Mayor of Grimesville (???)

0820 - Fed Regulators sign-off on Financial Assurance (in writing), along with verification of "no obnoxious odors" rider due to financial assurance bond of \$2M, relocation, indemnity, and site characteristics study along with Karma Kard concerning one "free" Regulatory Agency vote; no monies expended

0825 - New Mayor of Grimesville wants Restore to relocate new landfill in Grimesville vice San Manuel. Decision by team is to first get the first one (San Manuel) up and running.

0840 - Mtg with Mayor of San Manuel and DoD agreed in principle concerning lease agreement; details being hammered out.

- Second customer (So. California) is ready to go as soon as first plant is up and on line
- Line of Credit of \$12M available for completion of first plant, once all permits etc. in place.
- Contracts being sought with Babco, Big Oil, Behemoth to process their wastes.

0847: Agreement reached with DoD and city of San Manuel for lease of landfill site subject to following terms:

- No lease charges or fees to Restore, city has authority to lease land and make the agreement
- Duration 20 years or landfill operating life; whichever greater
- City indemnifies Restore for all cleanup costs and liabilities for pre-existing contamination
- Restore will be responsible for post acquisition contamination
- City and DoD accept Site Characterization Study as baseline for pre-existing conditions

0850: Initiatives underway

- Press release announcing all permits and regs satisfied being prepared
- Negotiating with Grimesville for their waste (0900 meeting)
- Financing in place, but execution deferred until agreement reached with Grimesville, for risk of prejudicing 0900 negotiations

Comments: Need to get away from stereotypes if environmental policy is ever to be made (too many trucks, etc.), vs. the outlook that we are giving away too much to the City in the first place.

0855 - With all other pieces of the puzzle apparently falling into place, Restore executes a written agreement with City and DoD for a 20 year lease, with the city indemnifying Restore for any prior environmental problems at that site.

0900 - Restore now sees its way clear to getting past the wickets and will be able to build its plant at the new site at north end of the military base. RFP (Roadrunner Financial Partners) concurs, and operating on a pledge made the previous day, executes an agreement to extend a \$12M line of credit to Restore to aid in building the facility. Loan cost will be 1%, and annual interest will be 1 point over prime on remaining balance.

0955 - Restore achieves attainment of required tests certifying adequacy of ground water monitoring stations by digging two additional wells. Restore also receives satisfactory completion of connectivity of cover lining (*a red herring in the game since cover would only be installed after landfill site had been filled, not while it was being built*).

1010 - Restore contracts with, and Yellow performs required tests and inspections, to certify clean and safe operation of the new landfill site prior to its being brought on line.

1030 - With all tests completed, Restore draws \$8M from its \$12M line of credit with RFP in order to commence plant construction/operation, paying associated fees.

1310 - A new venture is initiated by rep from SYP (Yellow). They want to invest \$25M in a going concern, and see Restore as a good bet. They want however a seat on the Board and substantial voting authority. Blue-1 discusses, but feels it is in a good position both currently and with respect to the future, and demurs, but does want SYP to come forward with more specifics on what it wants, and whether the \$25 M is a lump sum or is a series of investments.

1315 - While above discussions are ongoing, a different rep of SYP comes to Blue-1 table seeking investment of \$2M over 5 years (or \$400K each year) to go towards "Decision and Problem Solving" Committee regarding the environment. Restore's reps are feeling both rich and generous, and agree to transfer the funds, assuming that SYP will be investing heavily in Restore anyway. The contribution is made, but moments later, SYP tells Restore delegation the deal is off. (*Q: Did SYP have a left-hand/right-hand problem, or was this entire thing an orchestrated rip-off?*)

BLUE TEAM BALANCE SHEETS (Blue-1 Restore)

BLUE TEAM - ENTREPRENEURIAL BALANCE SHEET						
Session	Description of Transaction	Requirements met	Debt	Debit	Credit	Balance
			Millions	Millions	Millions	Millions
1	Initial Funds					10
1						
2	Karma Kard: Legal fee/file parent			1		9
2	Site characterization study (97%)	G-Env-1		1		8
2	Bad tech	----	----	----	----	8
3	Karma Kard: \$10K of legal fees				.01	8.01
3	Union Agreement	G-Public		.005		8.005
	National \$5M tax			5		3.005
	Verifying triple liner system	G-Rep-1		.15		2.855
	Site sewer location	G-Public		.25		2.605
	Lease of landfill - 20 yrs.+			.01		2.595
4	Karma Kard: Proxy vote					2.595
4	Consortium to est. reliability			.05		2.545
5	Karma Kard: Nat'l labs credit				1	3.545
5		Green Rep 3				3.545
	Cost of loan			.12		3.425
	Repeal of \$5M IRS tax				5	8.425
	Tech dev sys/cert/site for Grimesvle	To Yellow		1		7.425
6	Drew \$8M of \$12M line of credit		8		8	15.425
6	Interest for yr 2000 line of credit			.12		15.305
	Groundwater monitoring well			.02		15.285
	Correction to fine			.4		14.885
	Contribution to SYP			.4		14.485
	Totals =		8	9.525	14.01	\$14.485

Requirements

Green Team R (Federal)

Financial assurance to cover the following items:

- 1) Complete closure of landfill according to L/S/F Regs.
- 2) Accidental spill/release

- 3) Cost for base cleanup in landfill area according to L/S/F
- 4) Wetlands compensation

This requirement can be achieved by posting a bond in the amount of \$8M (*replaced by new requirements, see part #1 below*)

Blue Team Response:

- 1) Replaced by \$7M financial assurance
- 2) Relocation of site
- 3) Indemnity
- 4) Relocation and site characterization

Green Team R (Federal)

- 1) Financial assurance in writing of \$2M for closure
- 2) Provide verification by an independent lab that no significant obnoxious odors (such as hydrogen sulfide, ammonia, nitrates, nitrites and other chemicals) will be emitted from the landfill as proposed (Additional requirement applied with Karma Kard)

Blue Team Response:

- 1) Financial assurance bond as per agreement
- 2) Karma Kard (*additional regulator to break tie*)

Green Team R (State)

Restore must demonstrate through field-scale tests that the BAD process will decompose municipal solid wastes from the San Manuel community that are typical of daily generation at the rate claimed without adverse impacts on air, water, public health or safety. The tests must be conducted by an independent state-approved organization in accordance with a state-approved test and all state costs associated with the testing must be paid by Restore. The state will issue a variance from permitting requirement for the field tests.

Blue Team Response:

Blue 1 agrees to a restriction on the solid waste permit that limits the volume of the landfill to that of the projected deposited waste using the conventional technologies.

Bad technology must be monitored for performance and leachate run-off and air emissions and all data will be shared with Cal EPA and local permitting authorities. Cal EPA must improve a health and safety and contingency plan. Cal/EPA will remove its requirement for the prior demonstration if the above conditions are met.

Green Team R (Federal/State) (REQUIREMENT NOTIFICATION)

In early 1999, EPA and Cal/EPA conducted a surprise joint inspection of the construction activities of the Restore landfill at the San Manuel Air Force Base. Based on the inspection, EPA and Cal/EPA have issued a notice of violation to Restore. The notice of violation documents numerous (9) violations of Federal and State RCRA subtitle D provisions in the construction of the landfill. The most serious violations are: (1) Non-attainment of 1×10^{-5} cm/s

liner conductivity; (2) non-attainment of 1×10^{-5} cm/s cover conductivity; (3) inadequate groundwater monitoring system. With the notice of violation, Restore must cease and desist all activities at the landfill until an acceptable cure plan has been submitted and approved by EPA and Cal/EPA. Restore has 90 days to present an acceptable cure plan. Penalties of \$25,000/day, fines past the 90 days until an acceptable cure plan is submitted. Fines for the initial violations are being assessed in the amount of \$1M.

Green Team R (USEPA & CAL/EPA)

USEPA and CAL/EPA have conducted an inspection subsequent to Restore's submittal of documents and data as required in the 1999 Notice of Violation. These are the findings and results of that inspection: (1) Liner conductivity - OK; (2) Cover conductivity - needs to be brought to full as required - not there yet; (3) Two groundwater monitoring wells needed a) upstream; b) downstream. Two wells installed (see attached). Thickness of daily cover increased 25%.

The approved cure plan (see above) has been fully implemented and all violations of RCRA subtitle D have been corrected. The joint USEPA-CAL/EPA enforcement order has been complied with by Restore in all respects.

Green Team R (Local)

Independent documentation of performance of the liner system for the landfill to substantiate the protection of the existing groundwater quality and water quality in the Turkee River to assure the protection of the endangered "Turkee Salmon". In addition, the triple liner system must substantiate that leachate will be collected and treated in the treatment plant.

Blue Team Response:

A new site was selected and a site characterization study was done and passed. An evaluative performance of the liner system bench scale test was simulated and passed.

Green Team E

1. Site study to include hydrologic, seismic, geologic, etc. evaluation of the two proposed sites and consideration of other sites in San Manuel Co. (*Study performed; acceptable results*)

Green Team E

2. Build the system in phases with adequate demonstration of the reliability and efficacy of the technology at each step over the full life cycle, including monitoring and public access to data.

Blue Team Response:

Restore will furnish a phase-in schedule and will provide regular monitoring reports. Restore will do a technical audit.

Green Team E (Additional requirement from Karma Kard)

Process to assure: (1) No hazardous waste to landfills, (2) no waste from outside county.

Blue Team Response:

1. No hazardous waste - agreed.

2. No waste from outside county - Agreed with exceptions: a) assuming average waste equals no less than 450 ton/day; b) if it drops below 450 tons for 3 consecutive months, waste may be taken from outside the county to bring average back to 450 tons/day; c) waste can only be brought in from communities that have similar source reduction and recycling to San Manuel; d) waste from outside will be subjected to additional inspection to insure the exclusion of hazardous waste.

Green Team P

We are interested in short and long term jobs and quality of life. Prove that they will be positively affected.

Blue Team Response:

1 million shares (current value = \$3.5 million) annual dividends - \$250,000. Unemployment - preferential hiring. Low business turnover - 20 yr. commitment. Education: \$50,000 in-kind services per year for education, long term. \$50,000 short term - job training, summer jobs. Controlled growth - local waste. Tax incentives. Odor.

Green Team P

The location is unacceptable. We don't want it on the river and we don't want the trucks traveling through town. Give us alternate sites.

Blue Team Response:

The new location is acceptable because it is off the river. The 25 trucks on US 101 is acceptable with reconsideration if the number of trucks increases to 35 or over. *Restore also agreed that "all individuals hired by Restore to be truck drivers on vehicles going to and from the landfill will be members of the Teamster's Local 235.*

Post-Game Debriefing: Presenter - Mark Hooper

Key Success Issues

- * Reactive vs. proactive *If you wait, the series of events will overtake your decisions*
 - * Focused \Rightarrow goal oriented. *Stayed focused with respect to site.*
 - * Minimize adversarial situations; cooperate
 - * Partnering where possible
 - * Less controversial location. *Location of site was key. Willing to move site within limits.*
 - * Teaming — skills & tasks matched. *Split into three teams to move forward in parallel. Each member worked in an area in which he was comfortable. Two-person team concept was particularly good.*
-

Goals

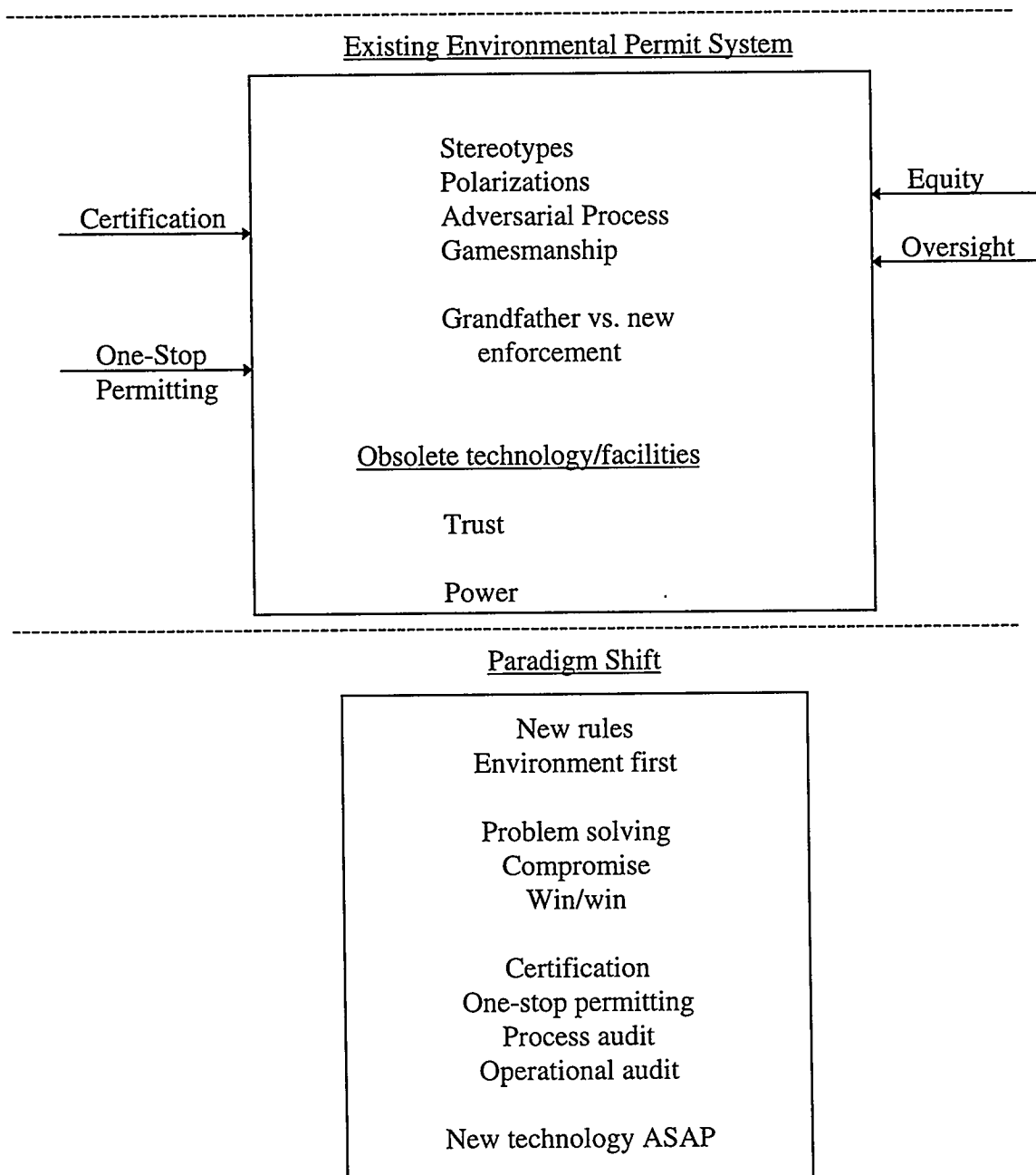
Functional Facility. *State of the art landfill that met all standards.*

— Technical

- Economical
- Community involvement

Functional Process

- Use process elsewhere
- Passing permits
- Identify customers



Positives: Interactions, relationships developed, and learning process.

Negatives: Eerily familiar; rules and processes haven't changed; stereotypes were fixed.

In real world, batting average for landfills is about 1 in 10.

*Environment suffered while we played the game, because of the system that we play in.
Process as written enhances polarization and stereotypes.
Current paradigm tends to perpetuate obsolete technologies.
Trust is the problem; as a result empires get built. And efforts are to stop new technologies rather than invent new ones.
What needs to be done is to shift paradigms, get new set of rules oriented towards problem-solving, compromise, win/win, certification, one-stop permitting, process audits, operational audits, and bring new technologies on line ASAP.*

Questions

1. Would Sandia put on a follow-up session based on paradigm shift?
 2. Who in audience would attend?
-

Analyst's Report

Blue Team One was comprised of six highly motivated individuals. Of the six, all were either CEOs or Directors, and five were directly involved in the technology end of the environmental business, while the sixth was more engaged in consensus building and Public Relations. This team composition initially led to difficulty in organizing, since all were used to leading, and no one wanted to accept the leadership of any other team member. During this period, discussion frequently went back and forth from goals and objectives, on one hand, to "how do we organize to get there" on the other.

The Facilitator constantly reminded (threatened) the team that requirements and demands were going to start coming early on the first morning of play. With that prospect looming, the team decided the first night that their initial goal would be to get the San Manuel plant up and running as soon as possible, and then turn its attention to follow-on locations (and marketing those) at a later point. Although revisited on the second morning, and then several times again thereafter, this early reconciliation of goal-setting did enable Blue Team-1 to move quickly on to implementation.

Organization was not so easily decided however, and resulted in a situation where the team believed it actually had no single supreme decision-making authority, but in fact one of the members had succeeded in gaining control over territory (he seldom left the table), levers (the financial position of the company), and direction (members de facto were acting at his bidding without realizing the extent to which they were doing so).

The group decided to form itself into three teams of two persons each, which turned out to be optimal. Whenever a negotiation was scheduled the sub-team members could depend on a second opinion/decision which could be rapidly made on location, and there was still a quorum of the team left at the HQ table. Interestingly, the de facto team leader who had devised this method of organizing and operating, and who had identified which team members would be on which sub-teams, usually sent his own sub-team member off for negotiations, or arranged that negotiations

within himself would be conducted in the immediate vicinity of Team 1's table. Had this person announced his intention to operate thusly, the team would in all likelihood not have accepted it. And after the game, several team members that I talked to announced proudly that "Restore Team really did not have a supreme leader."

In two key ways Restore kept its collective eye on the ball. Even when the timetable lagged into 1996 and 1997 its self-established time frame of getting the plant operating before 2000 was still attainable, and the team did not become panicky or derailed. Rather, the de facto CEO took his sub-team members aside and they went over the books and developed a more specific timetable, course of action, and list of "carrots" which could be offered; and also established "drop-dead" lines which they would not cross in negotiations. Although this discussion was never fully related to the rest of the team, the "acting CEO" clearly worked from it in all future decision making, and ensured that it was used as criteria for all future Blue-1 actions.

Then, once the team's goal was clearly within reach, they remained focused on completing the initial and primary objective rather than starting to market follow-on plants, which some were tempted to do.

In game terms, Restore was a smashing success. By the end of the five year period they had increased "ready cash" as per balance sheet by almost 50%, and profits from the plant venture were just starting to come on line. However, in a broader sense Restore might not have adjudged itself so successful. By the scenario the county would reach saturation on its existing landfill within one year, yet it took almost four years for Restore to complete the set of regulatory and legislative wickets needed to get permission to build, and no time was factored in by the team for how long it actually took to construct the plant and then get any additional inspections and permits needed. And what company realistically has a \$10M fund set aside for five years to tide it through a set of hurdles and then keeps that money in place despite no results in the first two years?

Blue Team-1 never was much for reflection and deep thinking. The team was extremely task-oriented and tended to work "hand over hand" in its approach to problem solving. At most one or perhaps two members of the team achieved "Level 7 = Series" thinking, but most members of the team worked throughout the game at Level 5, and some moved up cognitively to Level 6 during the course of the game.

2. Comments on Substance of the Game

The game itself was heavily focused on the extant process of decision-making in the environmental arena. To one not well-versed in that arena (this analyst) the results and insights concerning the many obstacles and diverse points of view was interesting and enlightening. However, to many players, since they already operate within that environment, there was little to be gained from reviewing the stresses and inadequacies of the process itself. One key observation is that each entity/participant in the process of moving an environmental technology to market knows well both his and others' roles, so role-playing in the game (which seemed to reflect real life) was easy. Only when such stereotypes can be broken down will the process be improved.

So how does one design a game using a "new paradigm"? Three come to mind:

(1) *Game - Study - Game as a process.* Since games by definition involve interactions among human beings making decisions, no two games are repeatable. The best that can be hoped for are "insights" about real-world processes, assumptions, and perhaps getting the questions right. The real value of games comes when an entity decides it needs to (as most should) deal with the issues that inherently arise out of games. That involves review of those issues, assignment, small group study to find solutions or work arounds, and then, perhaps six months or more later, another game to investigate further those issues and, hopefully, how some of the proposed solutions will play out. Environmental Prosperity Game did establish issues -- mainly that current regulatory schemes, entities, and processes are too expensive, too time consuming, and too cumbersome to serve the end for which they were created. Players did generally realize this, in part because of the condensed framework in which they had to face the multitude of those problems. Now the hard work begins.

(2) *Coopt Participation in Building a New Paradigm.* Players love to fight scenarios inside a game, and then challenge them after the game for having been inadequate for allowing the players to learn things they hadn't even realized, at game start, that they wanted to learn about or that a game environment would help them with. One conclusion of the Environmental Prosperity Game is that a whole new paradigm is needed for industry, regulators, legislators, and others in the environmental arena. But if that "new paradigm" were to be created, and then designed into a subsequent game as a scenario, it would be rejected by most players as "not invented here". The work around is to coopt players by engaging them in the building of the scenario/paradigm itself. This usually, although not necessarily, involves a set of workshops (or focus groups) to develop discrete aspects of the new paradigm. Pivotal is that those who participate in the workshops must also be participants in the game. Then they are "owners" of the scenario/new paradigm, and will work within the game to use it as a basis for future planning rather than joining those who see it for the first time, as bellyacher.

It might be thought that if folks cannot agree despite all that is at stake in the "real world" they will not be able to do so in the short and simulated environment of a workshop and/or game. But that is not so at all; rather, the unreality allows them the freedom to experiment.

BLUE TEAM 2 - Babco, Inc.

Chronology and Highlights

The objective of Babco was to produce electric car batteries. Although early attempts at building a plant in California were delayed due to requirements and financial problems, the team had a German company build batteries in the interim. The Babco team also considered themselves in the transportation business and occasionally discussed a Transport Conveyance Module (TCM) to be developed in the future based on their technology.

The team was initially composed of three individuals. Discussion at dinner on Wednesday night centered on how to organize their company although several decisions were deferred until Thursday when more of the team would be present (however, the rest of the team didn't materialize). Al Keicher brought in an organizational chart and a summary and schedule of what needed to be accomplished. This organizational chart consisted of a President to whom a Director of Planning and Vice Presidents of Research and Development, Marketing and Public Relations, Finance, Legal Affairs, Environmental Oversight, and Production reported. On Thursday morning (with the team still at three) discussion centered on combining the Vice Presidencies and assigning roles. Al Keicher became President. The rest of the team was comfortable with him in this role. Research and Development was combined with Production and Al Myers took on this role. Ambrose took on the combined role of Marketing and Public Relations and Environmental Oversight. None of the three felt comfortable with Finance or Legal Affairs and the decision was made early to hire a lawyer when needed. The financial problem was not dealt with until later.

The team was given a choice to be distributed into other teams or to continue. By this time (early Thursday) the team had bonded and had already adapted to their roles and did not want to disband. They chose to try to make the team work although they knew everyone would be spread very thin.

The three original members developed an interesting relationship. The two Als typically talked to other teams with a tag-team approach. Al Myers talked about the general technical merits of the battery and the technical questions, then Al Keicher would focus the discussion on the immediate problem. Ambrose typically worked alone with very little direction from the team. He achieved good results that contributed to the overall goals of the team. The team grew on Thursday when Sally Jo Webb was added due to a public team Karma Kard. Al Keicher immediately tried to assess her strengths (as he had with the other players on Wednesday night) in order to use her most effectively. She did not become intimately involved in the team. She tended to find things that needed to be done and she would take care of them on her own. She was delighted to deal with the public and I think she had very strong feelings toward that group. She also tended to interface with the legislature more than the other team members. Carolita Oliveros was hired by the team as a financial consultant. She brought badly needed expertise to the team. Len Hiles also joined the team as a technical consultant following layoffs at the national labs. He went through an interview process before becoming part of the team and, unlike the rest of the team members, was paid an annual salary.

Wednesday night:

The team felt that they had a poorly managed company. Al Myers indicated that he would be laying people off if his company was in Babco's financial situation. Al Myers also thought that customers were very important and that they needed to cultivate more customers. He felt that they needed orders and teaming before going to the financial people. The technology was not thought to be a problem.

Dinner discussion focused on the missing team members. The team dynamics were quickly established. The two Als discussed what needed to be done and how to do it. Al Myers wanted to look into linkages, synergism, and cost sharing with other Blue teams. Al Keicher was very well prepared with notes and dwelt on individual strengths. During these discussions, Ambrose was making organizational charts on his own. The operating mode of the two Als discussing while Ambrose tended to work on his own continued throughout the game.

Session 1 (1995)

The team was still discussing roles and responsibilities when GMC and Ford came over at 8:15 along with the mayor of Grimesville. GMC wanted to know how soon Babco could deliver batteries and if there was anything that GMC could do to help. GMC was possibly interested in a joint venture. Al Keicher suggested that a Memorandum of Understanding be drafted including a commitment for purchase of the product. This would allow Babco to go to the financial people. GMC stressed the importance of a 200-mile battery. Al Myers pointed out that for now this is the product but we will try to improve it in the future. GMC really wanted the 200-mile battery and asked how they could assist Babco in getting there. Al Myers thought the best way to help was to develop a new car design instead of replacing the engine in the current design. GMC wanted to know if Babco could do a CRADA with JNL and GMC wants assurance from JNL on the product. Al Myers continued the discussion of a design for the 1 person 1 car market; however, GMC/Ford wanted to work together on the power source, not on the car design because that is where they will compete. Al Keicher ended the discussion by indicating that Babco needed to talk among themselves regarding these issues. Babco also wanted to know if another National lab would suffice (instead of JNL) because of JNL's relationship to USABC. (There was also a discussion between Ford and GMC regarding the possibility that they could produce a short term design together and share the losses.)

The Grimesville mayor wanted to be sure that Babco was working with the city, in particular the zoning commission, and was involving the community in the design phase. The mayor wanted an advisory committee; however, Al Myers thought that the language in defining this relationship was very important.

DoD made 8:55 a.m. appointment about locating the plant on the base. Babco is not particularly interested in that site. Al Keicher believes there are too many advantages with their current site (e.g., public support, base may have contamination).

At 8:42 a.m. Al Myers went to make an appointment with JNL about CRADA. JNL will put together proposal.

Ambrose made a 9:00 a.m. appointment with the Grimesville mayor/chamber of commerce.

The first discussion with Finance occurred at 8:55 a.m. Al Keicher went to Finance with GMC. The presentation was not very well prepared and there was no financial plan. Al Keicher considered it an introductory type of visit. GMC will consider two ideas: (1) an agreement to buy so many batteries at a given price or (2) an equity investment. Finance thought Babco was fairly well positioned although they thought more support from other companies would be really helpful.

Babco held a status meeting at 9:10. Al Keicher gave a summary of the finance interaction. Al Myers had received a formal presentation regarding the base. The base will be considered as a backup site only. Al Myers talked to ROCAR about similarities in their problems, although there didn't seem to be an immediate benefit from this interaction. Al Myers believes we need acceptance by the public of the location since it is located near a residential area. Al Keicher is concerned about certification of a clean industry. Babco discussed the agreement with GMC and how to deal with proprietary information. Babco needs to take initial discussions and turn them into formal agreements regarding the proprietary information. This discussion ended at 9:34 a.m. followed by a feeling of a slowdown. Al Keicher wanted to know how to speed up.

During the status meeting Babco was interrupted twice. At 9:11 a.m. David Buckmaster from the legislature stopped by to introduce himself and ask about issues. He considers himself pro-business. At 9:14 a.m. Jennifer Hernandez (Red J/L) dropped off agreements in an attempt to create business.

Ambrose went to talk to GMC regarding the sale of batteries. He then began working with the lawyer regarding the MOU.

The remainder of the team began talking about a second issue of stock at 9:40 a.m. and then started on the business plan. A lawyer (Jennifer) will advise and represent us as needed. As noted earlier, none of the team members felt comfortable with this area.

At 9:53 a.m. GMC stated that they may go to USABC to get the product unless Babco hurries up. Following this threat from GMC, Babco put pressure on the labs. Babco has two needs. The near term is a risk assessment and opinion (white paper) and the long term is help with the 200-mile battery. Babco is willing to share new licenses and patents. Much of the discussion centered on USABC and interface between them and JNL. JNL estimated a risk assessment would cost \$125K for 50% probability of success and the 200-mile battery would cost \$1M. Babco chose to pay \$375K and \$1.5M resulting in the success of both ventures. The plant should be finished in 12-18 months.

Session 2 (1996)

Babco had good Karma - the company received a \$1M government grant. The general strategy with the requirements was to discuss them in general terms with the entity that the requirements were developed by, come to an agreement, then write up the response. This strategy was not

discussed by the team; it just naturally evolved. The team did not seem to expect to get the requirement signed off at the first meeting.

Al Keicher met with the state regulators and stated that he didn't see any problems with meeting the requirement. The state thought that computer modeling was not good enough and wanted to know about any pilot projects. Al thought that a demonstration of the plant may be a problem but that JNL had developed a prototype of the battery.

Al Myers met with the environmentalists. The environmentalists wanted an independent review with Babco paying the bill. Al did not think that this would be a problem and continued to look for synergy in satisfying requirements.

Al Myers also met with the federal regulators. He discussed the technical merits of the project and the similarity to other systems (e.g., the semiconductor industry). He cautioned the regulators about the proprietary nature of his discussion. He told the regulators that Babco has third party verification and that the emissions would be in ppb with a particle size of less than 0.5 micron. He also thought that the federal regulators were asking for things we were doing anyway.

The other environmentalist requirement was concerned with what happens if the technology doesn't work, the plant shuts down, and there is no money for cleanup. An escrow account was suggested, with the amount determined by Solve Your Problems (SYP-Yellow). Babco agreed to this approach and placed \$150K in escrow. This requirement was passed.

The two public requirements caused some dismay among Babco as they wanted equity in the company and to control who was hired at the plant. These resulted in discussions regarding what does the public really need and is there a way that Babco can fulfill those needs in a more palatable fashion. The luncheon meeting called by the mayor of Grimesville facilitated these discussions resulting in discussion of a Babco benevolent foundation that would channel money into the community.

Session 3 (1997)

Babco again had good Karma and received \$1M to be spent at the Yellow team.

At 1:35 p.m. an agreement with GMC regarding sales was reached. This information was used in a meeting with finance. The current Babco proposal is for a \$20M loan and \$10M in venture capital. A possibility was for GMC to buy stock. Finance was interested in future technologies and wanted an exclusive license. They also were only willing to put up \$10M. They trust the technology but not necessarily the management of Babco because of the poor balance sheet.

During the rest of this year, many financial strategies were discussed but there was not consensus on how to get the funding required. The importance of the financial hurdles was shown by Babco's focus on this subject with only some effort expended on the completion of requirements.

Sally wants to speak before the legislature on HR-1995-1.

At the end of this year, Patricia (Yellow Team) brought the coalition agreement for Babco's signature. This agreement will meet the public requirements placed on Babco.

Session 4 (1998)

As the new year dawned, GMC informed Babco that they were in breach of contract for the delivery of batteries. The morale of the group instantly plummeted. Their future was unknown and many questions were asked. Are we bankrupt? Are we out of the game? What happens now? Babco's Karma was somewhat indifferent in the form of a proxy vote for one of the regulator's requirements. The group began to refocus. One customer was lost; therefore, Babco needed to find a new customer.

The status of the team was that we had a proven technology for the 200-mile battery. In assessing what went wrong, money was the biggest problem and the project is now on hold. The need for a financial consultant was clear at this point and Babco hired Carolita Oliveros (Red-F). Babco was fortunate that there were no litigation problems because of the breach of contract.

This session was very active in both financial planning and completion of requirements. Carolita was an important addition to the team. She spent some time assessing the situation in order to give good advice later. Several financial plans were discussed including joint ventures with GMC and IPOs. Four requirements were completed during the year.

An agreement was reached with German Auto Work to supply Babco with batteries built using the Babco process but built in Germany. This solved the immediate problem of supplying batteries to GMC and would help solve some future problems (although I think this was unplanned).

Friday:

Session 5 (1999)

The team was ready to go at 8:00 a.m. Al Keicher came in with a summary of ongoing projects, new business, business development to discuss, and other business (otherwise known as Top Secret). The status meeting was difficult to conduct because it was hard to get everyone together and the meeting never completely happened. Individuals within the group were concerned about completing requirements. Sally Jo was delighted to deal with the public in the completion of those requirements. The possibility of the legislature guaranteeing loans was discussed and was sought. Babco wanted to involve Grimesville in lobbying for this.

Al Myers went to talk to David Buckmaster regarding legislation that could help Babco. Al used the precedent of Lockheed and the argument that the technology should be in the USA not in Germany where we are currently building our batteries. Al agreed to draft legislation.

GMC wanted to renegotiate price since they have been talking to another supplier.

Al Keicher discussed the state requirement for Babco. The regulator was very difficult to discuss the project with. The German plant data may be useful as a pilot project for data. The state wanted Babco to pay for travel to Germany. The state and Babco were agreeable for a third party

to go to Germany to report on the plant with Babco paying for this work. The Yellow Team estimated this would cost \$55K for a 50% probability of success. Al focused on money and percentage and wanted to negotiate with Yellow regarding the price. The eventual decision was to spend \$110K on this activity. The result was success and another requirement was completed.

Al Myers was concerned about the lack of a confidentiality agreement with the Germans. He had told the Germans about the top secret work (future development of a car). However, the lawyer was busy and couldn't help with the agreement. Al became very conscious of confidentiality agreements and had Big Oil and GMC sign them before releasing information regarding the car of the future.

Al M wants to talk to Big Oil because he thinks that they should realize they are a transportation company not just an oil company.

Due to layoffs at the national labs (heaven forbid) a new team member was interviewed. Len Hiles eventually joined the team and was paid \$125K a year plus stock options.

CUTS was approached for money to build plant. None was forthcoming.

Babco held another status meeting. The legislation is going well, Grimesville is supporting the bill. The \$38M is definitely a problem. The IPO is the best bet and needs an underwriter (they discussed true underwriting vs. best effort). The all electric car is still under consideration but the level of effort is not high most of the time. Big Oil, German Auto Works, Babco, and GMC will be involved. Al Myers believes that the trend for the 21st century is to have technology back in USA. Babco wants to keep the public happy since they are considered a big asset. Babco needs capital to build the plant and we want to have the answers for finance before they ask the question.

An agreement was made with the underwriter. This resulted in 2M shares being sold at \$6/share. After the underwriters commission, Babco received \$11.28M.

Session 6 (2000)

It was announced that state permitting was frozen. The only requirement left to be satisfied for Babco was that of the state. However, the state requirement was later completed. The final hurdle was financial.

Al Myers was worried about a hostile takeover although the company seems to be a poor target.

The search for money continues. Al Myers has talked to the Yellow Team but they don't seem to have enough money.

Carolita suggests that Babco could save money from their battery sales, wait and build the plant debt-free. This option was never seriously considered by the team although it was presented several times.

The all electric car idea was not receiving any attention at this time.

At 11:42 a.m. the legislature still hadn't looked at the bill to guarantee loans so Al Myers tried another tactic. He discussed the situation with the German supplier of Babco's batteries and investigated ways for the Germans to invest in a US plant. Al's original proposal was for a 50% investment by the Germans. The Germans countered with 25% (\$10M).

At 12:45 p.m. the Yellow Team wanted to invest up to \$25M and wanted to know what their return on investment would be. Al Keicher tried to protect Babco's assets by trying to get loans but not give up equity to the Yellow Team. Babco's proposal was to have Yellow buy Certificates of Deposit (CDs) with their \$23M which would be used as collateral for the bank. Babco would pay another 10% on top of the CD and expect it to be a 5-year loan. Yellow was willing to reduce the up front return for a bigger return later (e.g., 12% total on CDs and 5% of sales). Babco thought 5% of sales was too high and countered with 2%.

Ambrose informed Babco of some insider information - a non-polluting diesel engine has been developed.

At 1:23 p.m. the legislature passed the bill with support from the public. Babco obtained a \$25M loan.

At this point Babco had \$54.605M in cash and loans (balance sheet is attached) and planned to build the facility in California.

		Babco							
Session	Description of Transaction	Requirements Met	Debt	Debit	Credit	Balance	Yellow Debit	Yellow Credit	Yellow Balance
			Millions	Millions	Millions	Millions	Millions	Millions	Millions
1	Initial Funds					10			
	Risk Assessment			0.375		9.625			
	Battery development			1.5		8.125			
2	Karma: win \$1M				1	9.125			
	shutdown, D&D escrow	Env-2		0.15	0	8.975			
3	Karma: Yellow \$1M					8.975		1	1
	tax			1		7.975			1
4	Karma: Green-R proxy					7.975			1
	coalition agreement	Public-1				7.975			1
		Public-2				7.975			1
		Reg -1 Local				7.975			1
		Env-1				7.975			1
	financial services			0.1		7.875			1
5	Karma: 10 min legal					7.875			1
	5 min legal used					7.875			1
	tax reprieve				1	8.875			1
	German plant report	Reg-3 Federal				8.875	0.11		0.89
	Legislation			0.1		8.775			0.89
	Sold shares				11.28	20.055			0.89
	Battery sales				6	26.055			0.89
	consultant - 2 yrs			0.25		25.805			0.89
	financial consultant - 2 yrs			0.2		25.605			0.89
6	Battery sales				9	34.605			0.89
	Guaranteed loan		25		25	59.605			0.89
	to Grimesville	Reg-2 State		5		54.605			0.89
			25	8.675	53.28	54.605	0.11	1	0.89

Requirements

Green Team R (Federal)

Technical assurance of “zero-discharges” and “closed-loop” water recycle system fundamental to technology application. This requirement can be achieved by the following: 1) mass balance for both systems, 2) independent verification of mass balance, 3) detailed program for long-term verification of proposed mass balance.

Blue Team Response:

An analytical risk assessment of Babco plant construction methods and process as well as a detailed analysis of Babco’s “closed loop” process will meet its stated goals - if the process is realized as stated to SYP, Inc. This work included independent verification of mass balance based on the design detail provided to SYP, Inc. and the state of the art they applied to the process (see attachment). No pilot of full-scale testing was done as part of this work.

Green Team R (State)

Babco must submit to Cal/EPA: 1) a full operations plan for this battery manufacturing facility that includes complete descriptions and all operating parameters and limitations of all processes; 2) a contingency plan; 3) a health and safety plan and a waste analysis plan, and must conduct field-scale demonstration of all processes for which they don’t have adequate independent data to support their operations plan. Cal/EPA will issue a variance for such demonstrations and will oversee the demonstrations. Babco must pay all Cal/EPA costs associated with the demonstrations.

Blue Team Response:

The following approved documents are available for review: 1) full operation plan for plant operation - Doc. Babco #1001-R7, approved by Cal OSHA, City of Grimesville F.D., Babco safety office; 2) contingency plan for plant/process shutdown (emergency), C.G.F. D. Response Community Notification Network Action; 3) health/safety plan, Babco Doc. EHS #1004-R6, Review/Approved by CAL/OSHA/ CGFD; 4) waste analysis plan, Babco Doc. WAP #1004-R3, documents waste components qualities and dispose techniques; 5) re: field scale demonstrations, Babco has a full-scale plant in operation in Germany. Recommend that CAL/EPA visit that facility to verify process.

Addendum

Get credible 3rd party (lab OK) to verify to CAL/EPA all safety and health and environmental protections in Germany plan and then we will issue variance.

Green Team R (Local)

Performance improvement to 99.99% for the closed loop system based on independent evaluation of the system that shows it meets the above standard.

Blue Team Response:

A risk assessment of the Babco plant construction methods, processes meet all applicable standards, regulations and statutes. Detailed analysis of the plant processes show that Babco’s

closed loop approach does indeed meet the 99.99% requirement.

Green Team E

1. Build the facility in phases with adequate demonstration of the reliability and efficacy of the technology at each step over the full life cycle including monitoring and public access to data.

Blue Team Response:

Babco will fund at reasonable cost a review by engineering firm with substantial experience in relevant manufacturing processes. Firm will be selected by citizen's group and firm will report to citizen's group. Firm will maintain confidentiality of business data and intellectual property provided by Babco for purpose of evaluating Babco technology.

Green Team E

2. Demonstrate responsible operational procedures and ability to restore site in the event of failures or accidents.

Blue Team Response:

1) ISO 9000 certified within 6 weeks of start up; 2) Public right to review certification records; 3) escrow created to clean up plant in event Babco is unable/unwilling to clean up. Amount of escrow to be based on assessment by SYP as to clean up under worst case.

Amount determined to be \$150,000

Green Team P

We want a community-based committee to be in charge of referring all potential workers to Babco. Only residents may be hired by Babco, an exception may be granted by the committee due to unusual skills not present in the community.

Blue Team Response:

GOD Foundation through the Sustainable Education Program will designate and use their funds to train Grimesville citizens to work at Babco.

Babco advisory committee will be comprised of Babco, GOD Foundation, and environmental advocates. They will set training, environmental, safety and quality management practices.

Green Team P

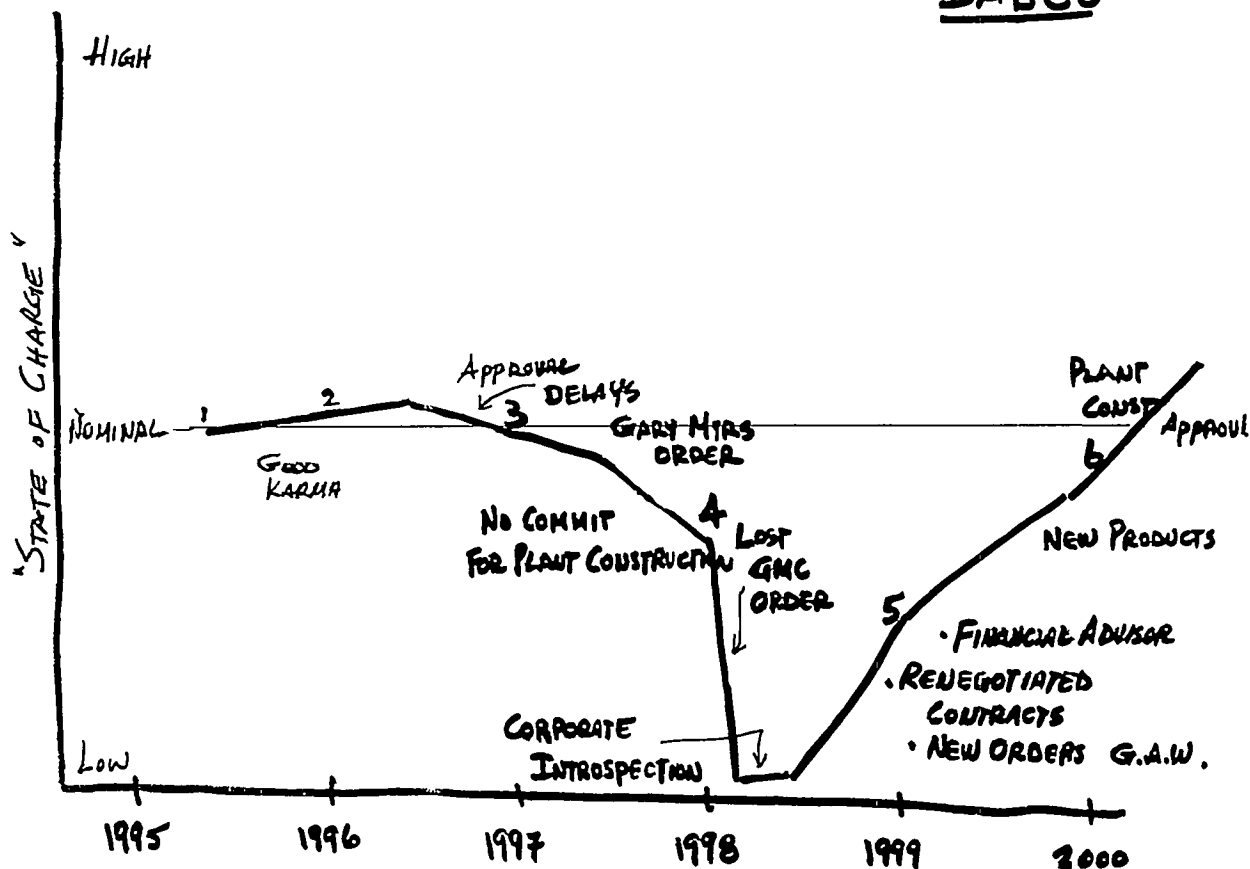
10% equity in the company (for use in county)

Blue Team Response:

Babco will provide 5% after tax profits of the Grimesville plant to Grimesville Organization for Development (GOD) Foundation, through the Babco Foundation. GOD Foundation will select Board of Directors to 'do good things' in community.

Post-Game Debriefing

BABCO



Analyst's Report

The Babco team began play with only three of the eight designated players attending the Game, yet managed to complete all assigned hurdles provided from the Green Teams and ended the Game with approximately \$53M which included a \$25M loan. One additional player was transferred to Babco and late in the game one part-time joined the team. The team leadership was quickly decided and team member interpersonal interactions were amicable throughout the game.

The Babco scenario centered on the commercialization of its new lithium-polymer electric battery designed for use in electric vehicles and the establishment of a new manufacturing plant to produce the batteries employing a new non-polluting manufacturing process. The team's focus was to find a way to build the new plant. Babco did not have sufficient assets to finance the new plant from internal funds nor to readily obtain external financing to build the new plant.

The initial financial strategy involved an unsuccessful gambit of attempting to leverage a negotiated contract, for future sales of battery products, to a large US automobile manufacturing corporation (GMC), to obtain venture capital and bank financing the proceeds of which would have been used to build a battery manufacturing plant. After initially being rejected for financing from the financial community, losing the sales contract to GMC because of product non-delivery,

and experiencing a brief lull in ascertaining strategic direction, the team hired an international financial consultant with expertise in technology licensing, who assisted Babco in developing an alternative strategy. The alternative financial strategy, which was successful, involved licensing of the Babco new battery technology to a European firm for production, and the purchasing of a portion of the European firm's battery production by Babco for resale in North America. Additionally, as part of an overall strategy to obtain funds to build the new manufacturing plant, Babco engaged an underwriting firm to perform an initial public offering of Babco's stock.

The result of the sale of 2M shares to the public netted \$11.28M. Babco had retained about \$6M from the initial \$10M for the new plant, thus providing \$17+ million towards the cost of the plant. After enhancement of their financial status with the profits from the foregoing strategy, Babco was able to enter into a strategic alliance with a community organization, where the new US manufacturing plant was to be built, and obtain sufficient funds from a \$25M SBA-backed loan to build the plant. A portion of this loan was designated to the community organization for training new Babco employees hired from the local community. Thus the symbiotic relationship was enhanced between Babco and the community via the local community organization.

Babco had obtained all the necessary ingredients to build the new lithium-polymer electric battery manufacturing plant employing the non-polluting process as the game ended. Early in the game, the Babco team experienced opposition to its plans to build the new manufacturing plant from members of the community where the plant was to be constructed. The community had concerns about the safety of the new manufacturing process. Babco's strategy with regard to community concerns, was to have the plant construction methods and the manufacturing process validated by a credible independent third party expert, after obtaining an agreement with the community that it would accept such validation. A contract for a process risk assessment was established with a credible third party firm resulting in the manufacturing process validation.

Additionally, community leaders were concerned about Babco hiring new employees from outside the community. These concerns were ameliorated by the agreement Babco made with community organizations described below, which stated that, through the community organization, a sustainable education program would be established and funds would be used to train local community citizens to work at the new Babco manufacturing plant.

To further enhance Babco's successful integration into the community where the new battery manufacturing plant was to be built, Babco established a non-profit foundation to channel a portion of its profits into the community. Babco agreed to provide 5% of after tax profits, through the Babco Foundation to the local non-profit foundation. The community established a non-profit organization to enhance the quality of life within the community called the Grimesville Organization for Development(GOD). Babco agreed to participate in the creation of a Babco Advisory Committee comprised of representatives from Babco, GOD, and community environmental advocates for the purpose of addressing training, safety, and quality management practices. The Advisory Committee parties (from the community sector), agreed to join Babco to secure the necessary permits for the new manufacturing plant construction and plant operation.

Babco also was able to obtain outside assistance in enhancing its battery design from a 159 mile

range to a 200 mile range. The firm assisting in this design received an up-front fee plus a back-end participation in Babco's profits from the sales of the 200 mile range batteries. Babco agreed to the profit sharing based upon the unique marketing position Babco would experience if the re-engineering was successful within the six months designated for the engineering firm to produce the 200 mile range battery design. This successful new battery design enabled Babco to enter into the sales agreement with GMC and subsequently engage the European firm to build the batteries after Babco lost the GMC contract due to the inability to build the manufacturing plant in time to meet product delivery to GMC. Subsequently Babco contracted to sell batteries produced by the European firm to another large US automobile manufacturer.

Babco hired legal counsel to assist its team members in negotiating and reaching contractual agreements with various parties. Babco team members used a cooperative posture to negotiate and reach consensus on issues that involved various teams' (sectors of society) interests. Babco engaged a lobbyist to work on passing state legislation which would provide loan guarantees for use by small corporations attempting to commercialize new technologies. Babco also initiated anti-takeover strategy by installing a method for shares to be issued to Babco management upon experiencing a hostile acquisition of Babco.

Money had too much influence (true to life). Team did not have enough money to reach their goal, but they had plenty to pay their way through the path on the way to their goal. Babco always went for double the median to "ensure" success. The low risk of losing never forced the team to deal in contingency space on these issues. In addition, the team never had to prioritize and take calculated risks. I thought the research was too cheap.

Given the structure of the game, it was very difficult to work at higher levels. The team thought in terms of let's try this and that and the other; however it was in terms of concrete ideas (e.g., let's talk to CUTS and see if they are interested and let's develop a broader customer base). The second day began with some thought about future products (maybe a 5-year outlook) but the reality of "this needs to be done now" almost always won.

The team worked very well together. They trusted one another's decisions and they tried to use their strengths to the team's best advantage. The interaction between the two Als was interesting. Al Keicher is very task-oriented while Al Myers is very people-oriented. This worked to the team's advantage since each person complemented the other.

The team showed an extreme sense of satisfaction at the end of the game - they felt they had won and were very proud. The team dealt with the game in a mostly reactive manner. I think they may have been more proactive if the time pressure wasn't as intense.

Improvements:

It was really tough to keep things organized - folders or something would have helped.

The copy machine was a bottleneck. I spent a significant amount of time there, especially on Friday morning when the team was making a lot of agreements, which meant I was away from the team. Having a dedicated copy person may be helpful.

BLUE TEAM 3 - ROCAR

Chronology and Highlights

ROCAR consisted of Big Oil (a petroleum company) and Clohi (a small company with a technology to treat volatile organic compounds - VOCs). Big Oil owned a refinery in San Manuel that needed to solve its VOC emissions or else it would have to shut down and move refining operations to a foreign country. Clohi offered Big Oil a technology that could successfully treat their VOC problem and allow continued operation of the refinery. Clohi's technology used a thermal oxidation "hot rocks" process to treat VOCs found in air emissions. As a technology development company, Clohi was looking for a successful demonstration of its technology and Big Oil provided this opportunity. Financially, Big Oil had many assets, while there was some question as to the financial stability of Clohi.

Leadership Selection Process, Characteristics

Early in the game, leaders for both the Big Oil and Clohi company were selected. These leaders were not selected by any formal process, but rather by a de facto process. In the Big Oil case, the leader was selected primarily based on the vision that the leader provided the group, in terms of Big Oil's relationship with Clohi as well as knowledge of financing options. It turned out that on the Big Oil team there were two team members that came from the same company. When the senior member of this company (who was also the first day's Big Oil leader) had to miss day two, the other member of this team became the leader on day two. This transition happened without any power struggles among Big Oil team members. However, the characteristics of how Big Oil approached various situations did change with these two leaders. On day one, the first Big Oil leader concentrated primarily on financing for the team and buying out Clohi. On day two, the second Big Oil leader's emphasis was on proving the technical basis of the Big Oil/Clohi team.

The Clohi leader was also selected on a de facto basis. Technologists made up most of the Clohi team. The technologist with the most experience was selected as the Clohi leader. In contrast to the Big Oil leader, the Clohi team leader concentrated on trying to demonstrate technical capabilities of the Clohi technology and late in the game was concerned with trying to work business deals with other companies. In addition, the Clohi leader was more willing to compromise with other teams than the Big Oil leadership.

Both Big Oil and Clohi had at least one dissenting member. These members had almost exactly opposite views to the de facto leaders. For instance, the Big Oil dissenting member was much more interested in having a combined Big Oil/Clohi team and in compromising with public teams. The Clohi dissenting member was very data-driven and therefore was not willing to compromise on issues.

Relationship Between Big Oil and Clohi:

The relationship between Big Oil and Clohi was strictly business-like. Big Oil felt that Clohi was not financially viable and therefore spent most of the first day trying to figure out ways to

buy a controlling interest in Clohi. (Big Oil was successful.) Big Oil acted like a prime contractor while Clohi was relegated to a subcontractor role. There was initially an attempt by the Big Oil dissenting member to have a more integrated Big Oil/Clohi team where both teams were involved in the decision-making process. However, the Big Oil leader quickly dissuaded the rest of the Big Oil team from taking this approach. Early in the game, Big Oil made it clear to Clohi that Big Oil would call all the shots, both financially as well as who was responsible for dealing with the public. Clohi's role initially in this relationship was to work the regulatory issues almost exclusively. This meant that Clohi personnel were the main contacts with regulators and in trying to satisfy their requirements working with the suppliers team to develop the test plans to meet these requirements. In this arrangement Clohi tried to work some backdoor deals with other teams, but either nothing came of them because Big Oil had Clohi off pursuing another area, or their actions were made known to Big Oil (for instance the financial team) who then politely turned down the financing Clohi was trying to put together. Near the end of the game, Big Oil felt like they had won (i.e., their refinery could continue operations using Clohi technology) and basically sat back. Clohi was allowed to pursue other business opportunities with the customers team and in fact did start commercializing their technology in areas other than for a refinery application.

ROCAR Team Strategy

The strategy of Big Oil (which essentially represented all of ROCAR) was to first buy out Clohi and secondly to meet the public team's requirements. In terms of the game's objective to work toward obtaining one-stop regulatory permitting, the team did not try to actively work this issue. Instead, the approach was to individually address the public team requirements and work these requirements until they were completed. For the public and regulatory teams this required multiple meetings before their requirements could be satisfied. In terms of dealing with other teams, there really was no consistent strategy. On a number of occasions, other teams came over and wanted to talk about opportunities or issues, however, generally the reaction was reactionary, i.e., Big Oil talked to the team if it directly impacted getting a requirement fulfilled. Otherwise, the other team was told to come back or was ignored. Although the team initially appeared to take an approach of listening to other team's concerns, if a disagreement arose, the team reverted to relying on data and made their arguments based solely on data. This technology-push strategy appeared to work well when working with other technology development teams or the customer team, but caused some problems when dealing with the regulatory and public teams (see below). This also tended to polarize the team's position, making them less likely to compromise once they had laid out the technical reasons for their decisions. There was no long range strategy for the team in terms of what happened once all their requirements were met. Big Oil team members felt that they had "won" when all requirements were met, while Clohi team members continued to pursue other business opportunities.

Relationships with Other Teams

Environmentalists: Discussions with the environmental group were handled by the dissenting Big Oil member. Because of the Big Oil representatives' willingness to compromise, these dealings were generally cordial. It only took two meetings for the environmentalists'

requirements to be met. However, it was interesting that during the second meeting the Big Oil representative's body language got very assertive (stood up, leaned over the table, pointed). The environmental representative's body language also became assertive in return, and after some semi-heated discussion, an agreement was reached. This seemed to demonstrate that a willingness by both parties to discuss compromises while reaching a decision can still be successful even if both parties get agitated with each other during the negotiating process.

Regulatory: Most of the interactions with the regulatory representatives were handled by Clohi personnel. The team's technology approach appeared to help in this area since the regulators in general required some type of test data to demonstrate that the Clohi VOC treatment system and Big Oil refinery could meet regulatory requirements. One area that frustrated the Clohi team was that it appeared to them that not all the requirements were initially specified by the regulators. In the CAL EPA case, the initial requirement was conditionally modified (meaning Clohi had to get either data or another team's sign off) at least two times. This was frustrating to Clohi because it meant in some cases that they had to go back to the supplier team for data that they felt they could have asked for in an earlier set of tests. (The key point for Clohi being that this added cost and time to the permitting process.) As it turned out, the regulatory requirements were one of the last set of requirements that ROCAR had to satisfy.

Public: The situation with the Public went from good to bad for ROCAR. Initial discussions with the public were handled by Big Oil team members. The initial set of discussions appeared to be cordial between the two teams and at the end of the meeting it appeared that it was just a formality to meet the Public requirement. However, a follow-up meeting left Big Oil with the feeling that the Public did not exactly know what they wanted, but that they wanted more. At this point, Big Oil, who had established that they handled all the dealings with the Public, decided that they would change their approach and the people dealing with the Public. Big Oil decided that perhaps Clohi, as a small business, would have more luck in getting the Public on their side. Clohi argued that if Big Oil could not get the Public's support that Clohi, as an up and coming small business, would be out of business as well as Big Oil. This approach backfired. The discussion did not go well between Clohi and the Public, and being that the Clohi representative selected was the dissenting member (i.e., data driven, make points based on data) and would not compromise, the Public decided to take Big Oil to court. Big Oil was taken to court on the second day, when Big Oil leadership changed to a more technical based approach. Before Big Oil and the Public went to court, there was a final meeting between Big Oil, the Public, and the Mayor of San Manuel. This meeting was interesting because it was obvious that at this point, Big Oil (because of their technology push approach) had already decided that the Public was unreasonable in their request, and that no matter what anyone said, they were going to court and expected to win. The Public came to the meeting with a very similar perspective. The Mayor, however, came as a willing arbitrator. Before the meeting, the Mayor had talked at length to the Public to find out where they were coming from. During the meeting the Mayor tried to interject some compromise options into the discussion, but both teams had already made up their minds. The Mayor's potential value came after the meeting when she stuck around after the Public had left and let Big Oil know that the Public would settle for less than they had demanded. The Mayor offered to be an arbitrator in every sense without saying the word "arbitrator." Big Oil was at this point so emotionally upset with the Public that they let this offer

completely go by. Big Oil and the Public went to Court. The Court decided that arbitration was appropriate. However, this arbitration went on for a long time because initially neither team wanted to compromise. During this arbitration, the Public made an offer that was about \$200K higher than Big Oil's. At this point, the dissenting members of Big Oil and Clohi got involved in the discussion. The Clohi dissenting member did not want to give in and in fact reinforced Big Oil leadership's position. The Big Oil dissenting member pointed out that with Big Oil's assets, \$200K was a drop in the bucket, so it was suggested that the team should settle with the Public, get out of court, "buy goodwill with the public", and talk to the media to get some positive press out of the agreement. In addition, the Clohi leader reinforced the Big Oil dissenting member's views. But as had happened in every other major decision, the Big Oil leader, with a technology push approach, made the decision for the group, did not compromise, and the arbitration continued. (Big Oil had comments like "don't throw good money after bad", "avoid frivolous lawsuits against Big Oil," and "don't think the Public has much to contribute in running a business.") There were several important lessons observed during this lawsuit. The lawsuit in game time went on for approximately a year, making the Public requirement one of the last to be successfully completed. The costs for the lawsuit were about 1/10th of the funds initially allocated to ROCAR, so the cost of the lawsuit was significant. The Big Oil dissenting member and Clohi leader wandered off after their suggestion was rejected by the team. After this point in the game they both basically did their own things, only loosely associating themselves with Big Oil. This division of the team could potentially be more detrimental to ROCAR than the lawsuit. The results of the lawsuit also point out that compromises should be considered at any point rather than taking hard-line, emotional approaches that ultimately end up locking an organization into a course of action that may not be in the best interest of the group.

Other Technology Development Teams: There was not a lot of contact or team building with other Technology Development teams. Big Oil's strategy did not appear to put much priority on making deals with other Technology Development teams. Clohi tried to position itself with Behemoth and Babco, as an alternative to their suppliers, but did not work very hard to work out the details with either company.

Legal: Initially, Big Oil hired legal counsel to advise them on issues associated with regulatory issues. When the Public took Big Oil to court, they again hired a legal counsel to represent them in the court proceedings. In each case, Big Oil used the legal team in a reactionary mode (i.e., address a current problem), rather than as a potential resource.

Finance: The Big Oil leader on day one of the games interfaced with the Finance team extensively to put together a buyout of Clohi. The buyout of Clohi was successful. On the second day, there were no interactions with the finance team.

Legislative: Because Big Oil's strategy was essentially to meet the public team's requirements, there was very limited interactions with the Legislative team. Most of the interactions were initiated by Legislative team members and were discussed with the Big Oil dissenting member because of his willingness to discuss legislative issues. Big Oil did not have a strategy for dealing with the Legislative team.

Summary

ROCAR was successful in implementing the Clohi plasma thermal treatment at the Big Oil refinery to control VOC emissions. Big Oil was the effective leader of ROCAR, operating as a prime contractor (i.e., making all major decisions) and Clohi serving as a subcontractor (working regulatory issues). The strategy of Big Oil was to meet all public requirements and to buy a controlling share of Clohi. Big Oil did not have a long term strategy in terms of dealing with the regulatory and legislative teams to put in place one stop permitting. In addition, Big Oil did not have a strategy for what kind of alliances they needed to make with other teams for the future after the public requirements were met. Although ROCAR was successful in meeting all requirements, there were several occasions when the team took a non-compromising approach to a situation even though other teams made it known subtly that they would be willing to serve as arbitrators. If these offers had have been picked up and implemented by ROCAR, they might have been able to meet their requirements quicker and at less total cost. This tends to point out that those companies that are very successful are better at identifying and following up on these types of offers (i.e., negotiation or compromise to a win-win situation) than other companies.

Some additional thoughts and suggestions:

1. Place more emphasis on strategic planning. The ROCAR team did planning by the seat of the pants. (For instance, during the game debriefing, it probably appeared to the participants at the game that ROCAR had a well thought out strategy. However, what the team presented was based on hindsight, i.e., what they actually did in the game, rather than a strategy that they developed early in the game and then tried to implement.)
2. Require a team to consider in detail their organizational structure. In Big Oil's case, the person that became the de facto leader simply came in and took charge, and made all decisions, almost devoid of group input. The strength of personality tends to define the leader. True in the real world, but its mitigated.
3. Technology solutions can be easily bought. Need a few more failures to make the teams come up with other options.
4. The Yellow supplier team should have different sub-teams, with different fee schedules, to make for some internal competition. For instance, a university, commercial, national lab teams, with higher costs, but potentially more to offer might make the provider team feel more useful.
5. The Blue teams with a lead and a sub seem difficult to manage for the team as well as for the facilitator/analyst. A single team with a goal seems to make more sense. (Even in war games, there may be a single operational command, but units are autonomous with their own goals and objectives.)
6. In both the Albuquerque practice game and at this game, the leader of technology development groups had a strong financial/entrepreneur background. Wonder if this is in general true?

Requirements

Green Team R (Federal)

Technical and mechanical assurance of "hot rocks" technology fundamental to technology application. This requirement can be achieved by the following: 1) mass balance for both systems; 2) independent verification of mass balance; 3) independent mechanical testing of critical systems for reliability and durability; 4) detailed program for long-term verification of proposed mass balance and mechanical integrity testing.

Blue Team Response:

1) Both Clohi and Big Oil have capability to do mass balancing and commit to do so; 2) under Sandia's contract, mass balancing was independently verified in bench model and computer modeling; 3) System will be built by contractors qualified under APT, ASTM and ISO 9000 requirements. Each piece of equipment will be tested before installation; 4) Sandia's contract included (computer modeling, path correlation between analysis and testing for emissions for VOC and flame characteristics, mass balancing; 5) OSHA required haz op analysis, will identify potential problems, if any, and help assure integrity; 6) field test data from test shows adequacy of emissions for certification.

Green Team R (State)

ROCAR must demonstrate to CAL/EPA that the Clohi system is not an incinerator under current state and federal definitions in order to enter the certification program. If the system is deemed by CAL/EPA not to be an incinerator or if the clear-cut decision could be made. CAL/EPA will accept the technology into the certification program. Full independently verified data on the technology's performance, safety and protectiveness of public health and the environment must be provided to CAL/EPA. CAL/EPA will recover all costs associated with certification from ROCAR. If certification is averted, CAL/EPA will work with all other permitting authorities to assist ROCAR in obtaining approvals.

Blue Team Response:

1) Putting in place a pilot program to certify an air pollution control technology; 2) ROCAR wants to proceed in the hazardous waste certification program on the assumption that there is not evidence to show it is an incinerator; 3) putting in place a program with Sandia CRF facility to show it is not an incinerator; 4) if Sandia tests show it is not an incinerator, then ROCAR is ahead of the game in providing information for the hazardous waste certification application. . Otherwise, ROCAR will apply for certification for air pollution control only.

Footnote

Based on data from Sandia tests, CAL/EPA finds that the Clohi system is not an incinerator. CAL/EPA will proceed with the evaluation of this technology for potential certification both for hazardous waste and air pollution control.

Green Team R (Local)

Obtain the state of California certification of Clohi technology for the Big Oil refinery for the treatment of VOC's is required.

Blue Team Response:

Increase VOC, NOX and CO test program at influent and effluent of Clohi thermal oxidation

unit. 1000/sample x 2/sample/day x 2 weeks, 24 weeks additional \$104,000 x 5% vol. discount 98.8K. Final report due 4 weeks after final sample. Periodic reports 3 times/6 mos. To be completed 7 mo. from today (3/31). 98.8 K provide 50% probability of success (SUCCESS)

Analyze for VOC, NOX and CO at influent and effluent of Clohi thermal oxidation unit. \$1000/sample x 2 samples/day x 2 weeks = \$28,000 - 50% probability of success. Increased probability of success as determined by probability graph to be completed within the first 45 days of the installation or of the field prototype. (8 months from today, 3/30). \$56K (SUCCESS)

Green Team E

1. Build the system in phases with adequate demonstration of the reliability and efficacy of the technology at each step over the full life cycle, including monitoring and public access to data.

Blue Team Response:

1) Our plan is to build the system in phases; 2) 1/10 scale plant; 3) \$100K for independent consultant (qualification mutually agreed upon).

Green Team E

2. Environmental impact report which addresses consequences of all credible accidents and failures and potential new toxic emissions.

Blue Team Response:

1) Hazard analysis by Big Oil and provides results, risk assessment included; 2) EIR is part of our Def. Plan.

Green P

Guarantee continuation of jobs at current levels.

Blue Team Response:

See settlement agreement below per mediator.

Green P

Prove to us that this will not be another Bhopal (India)

Blue Team Response:

Big Oil to establish citizen's advisory committee. Membership to include CAST member. See settlement agreement below per mediator.

SETTLEMENT AGREEMENT

Green Team Public (GTP) and Green Oil, Inc. (GOI) agree to settle their dispute (Case No. 3 pending in the Superior Court of San Manuel County) as follows:

1. GOI shall pay GTP \$800,000 on March 31, 1995 by 11:15 am.

2. If GOI leaves the County of San Manuel anytime within 15 years of the date of this settlement, then GOI shall pay GTP an additional \$1 million to retrain any workers who lose their jobs thereby.
 3. GTP shall: 1) dismiss this action with prejudice and 2) sign a general release of all liability for any and all claims involved in this action or now existing between and among any parties hereto; such release shall be delivered to and shall benefit GOI and all of its employees.
 - 4) GTP further agrees that no funds paid by GOI shall be used to finance further litigation against GOI.
 - 5) The parties shall bear their own court costs and attorneys' fees, which each party agrees to forthwith to pay to the clerk of the court.
 - 6) The undersigned representatives of GTP hereby represent that they constitute all the parties involved in GTP, and agree to indemnify GOI if any new party makes any claim based on the same allegations as were involved in this lawsuit.
-

Post-Game Debriefing: Presenter - Ann Heywood

Game Observations

1. Each team has predetermined goal
 2. More frequent newscasts (headline news)
 3. Time and money reasonable
 4. Approval process tied to financial model makes it too easy - explore randomness in the process
 5. Realistic complexity
 6. Time pressure heavy in early part of game - too light at end
-

Frustrations

1. Lack of specific requirements and regulatory decisions
 2. Multiple regulators/multiple meetings
 3. Time compression (permitting - 4 yrs.)
 4. Public - inadequate guidance
-

Successes

1. Certification for air pollution control and hazardous waste stream treatment
 2. Developed financially viable entity
 3. Successfully demonstrated technology
 4. Full-scale demonstration
 5. Agreements for research and fabrication facilities
 6. Agreements, sales, new products
-

Strategy

1. Cooperative relationships (Big Oil/Clohi)
 2. Get permits for prototype
 3. Field testing and certification
 4. Full-scale fabrication and implementation
 5. Establish local fabrication facility (with offshore financing)
 6. Marketing
 7. Product diversification
-

Goals

1. Refinery continued operation
2. Maintain health and safety within community and improve the environment
3. Enhance/maintain bottom line
4. Spin-off company (Clohi) for new technology
5. Expand product line

Analyst's Report

Players

The players on ROCAR were generally very engaged in the game. John Schofield could only participate on the first day. Tsuneyuki Ueki had to leave early on the second day. All others played the entire game. "Yuki" clearly was in culture shock, not being used to the fast pace, wheeling-dealing nature of the game and the rest of his team-mates. He listened intently, but I never saw him contribute to any of the strategies or negotiations.

The players were all knowledgeable in some, if not many, aspects of the environmental arena. As in previous games, the more subject-matter expertise the players have coming into the game, the more effective they are. John Schofield became the de facto leader of the Big Oil faction and had considerable influence on his Clohi compatriots. The Clohi team had diverse backgrounds, and no clear leader on all issues emerged. All players, except Yuki, contributed to the game even though they may have followed the lead of another individual. By the end of the game, they were clearly one team dedicated to pursuing the cause as a single company.

Game Dynamics

The first major issue for the team was that they could not figure out how a "virtual company" of Big Oil and Clohi could do business. They spent considerable time early in the game trying to come up with a legal arrangement that would allow them to team and be able to legally make deals. Some tension existed between Big Oil and Clohi for the first few hours. Finally, Big Oil gave Clohi a small contract to make Clohi somewhat financially stable and proceeded with the game. (Eventually, the team came up with a stock exchange agreement, engineered by John Schofield, that in effect made Clohi a wholly owned subsidiary of Big Oil and made the Clohi employees owners of significant stock assets, not exactly golden handcuffs but a really good deal.)

At the beginning of the game, the team focus was on basic survival strategy (concrete day-to-day strategy, up to level IV) and what was required to achieve that. As the game progressed, trust began to build among team members, and smaller teams were formed with the authority from the group to negotiate deals. Strategy was formed in a team mode with suggestions coming from all quarters. When a loose consensus was formed on a particular path, an individual or small team was dispatched to implement it. The level of information processing and complexity continually rose through the game; as the basic foundation was implemented, more complicated, longer term strategies began to emerge. At the end of the game, talk of global strategies began.

The early strategy focused on direct discussions with the Green teams whose regulations and constraints they were required to solve. Other than the legal team, no serious use was made of resources in the other Red and Purple team. The Yellow team was used whenever a technical problem that needed an “honest broker” validation was required. ROCAR had plenty of money to buy what they needed at the Yellow team prices. Had the game run longer, the other Red teams and Purple team would probably have been utilized, but in the short run ROCAR didn’t need them. Perhaps if their Karma Kards (see below) had been less favorable, ROCAR would have had to be more creative.

There was plenty of money for ROCAR, although the team was a little frustrated that Big Oil had tremendous assets they weren’t allowed to tap. The stock swap to join companies was a response to their inability to tap Big Oil’s cash assets. There were several comments that in the real world Big Oil would simply “buy” Clohi if it was important to Big Oil’s ability to get permitted using the Clohi technology. In general, however, the players thought the game to be fairly realistic.

The Green public team took a hard negotiating line that clearly frustrated ROCAR. It diverted a lot of their energy into trying to find a solution, but, finally, ROCAR simply forced the issue to court because no “reasonable” approach seemed to work. I think the team felt this situation was a little unreal.

The Karma Kards were nearly all favorable to ROCAR. The only severely negative Kard occurred late in the game when they had plenty of cash to cover the \$1M payment. As always, it’s often better to be lucky than smart.

BLUE TEAM 4 - CUTS

Chronology and Highlights

Background & Early Planning:

The team had a good, brief strategic discussion and a collaborative approach from the outset (within 5-10 minutes). This was definitely an entrepreneurial team---most of their time and energy was spent "doing" rather than discussing. Two players were very verbal and dominated initial conversations. However, there were no power struggles and after brief initial discussions (which were interrupted by advances from members of several other teams), team members just seemed to know what to do. Team members exhibited a high level of trust in each other, no one attempted to dominate, and individuals evolved specialized roles quickly without much discussion or apparent planning.

The team operated in a highly entrepreneurial fashion, making many deals (~40 total), seizing opportunities as they occurred. Many times during the game it appeared that things were moving so fast and so many team members were doing individual, apparently unrelated things that achievement of a common goal was highly unlikely. From the outset, team members exhibited high levels of initiative and confidence, leaving the group for interactions with various other teams. Most of the time few team members were gathered around the table. However, closer observation revealed that one team member was the anchor ("CEO")--he was almost always at the table to provide continuity. Others would return individually & in small groups to report in or "huddle" for quick discussions with him. When the team became too divergent, he sounded warnings (a few times even insisting on a coordinating meeting). This person had pushed repeatedly for more time & effort on initial organization and planning, but the team really did not follow. Interestingly, he did accomplish this longer-term in the much more informal way noted above!

Strategy:

The team's major strategy discussion was held briefly the first evening. It was a rambling discussion of many tactical and strategic issues which repeatedly returned to the theme: each company (Behemoth & Electra) should determine & state their objectives, the two should then identify joint objectives and develop further strategies & tactics based on the joint objectives. They intended to revisit this discussion the first day, but got pulled into the game very quickly and just "went with the flow" out of necessity. Amusingly, the person who was universally accepted in the "CEO role", worried throughout the game about the need for a strategic plan-----he simultaneously kept track of progress and worked at writing it throughout the game. He appeared to be the only member who needed it; the rest of the team seemed very comfortable with an extremely informal style.

In the initial strategy discussion, they quickly agreed that Electra & Behemoth were "in it together". They felt the two companies *must* collaborate to succeed. This was stated on the first evening and the team never deviated from that commitment. Their commitment to each other was very strong--to the point of deciding to commit to the partnership and pledging not to

actively explore other technology-oriented partnerships because it might drain energy and detract from their joint success.

Key points of agreement:

1. Behemoth was motivated to help Electra be successful because Electra's technology was cheaper and would be key to Behemoth's long-term success (this led to extensive bank-rolling of Electra early in the game). *Note:* Because of the high trust level between the two companies, their relationship was based solely on a handshake till noon of the first day when it was (somewhat) formalized via an agreement giving Behemoth an equity position in Electra in exchange for much-needed capital.
2. Electra's primary goal was to verify technology and get certification as soon as possible to lay groundwork for long-term success of the partnership (initial stated goal: during 1st year of operation).
3. Behemoth's primary goal was to maximize return on assets early in the game (e.g. clean up quickly and sell land) and get back to its core business (i.e., diesel-related, *not* environmental clean-up).

Tactically this team's mode of operation was to focus almost entirely on the short-term, with emphasis on seizing opportunities of the moment.

They continually "blew off" the Legislators. Their priorities were on doing deals and enhancing their business. They did not seem to believe that taking time to influence the legislative process (e.g. by participating in hearings, etc.). would pay off.

Observations:

I wondered throughout the game whether this team's extreme informality and entrepreneurial style would get them in trouble. It never did, largely because they seemed to instinctively know when to return, report, and coordinate (however loosely) with the rest of the team.

The level of trust and commitment between these team members was unbelievable! For instance, when a Karma Kard required exchange of one member with the Regulator team, they were devastated. They felt so strongly about the negative effect this would have on the team that they negotiated an outrageous deal delaying the exchange for 5 years (on grounds of "conflict of interest")!!

Team had trouble keeping track of agreements....how many, what, status...and maintaining an overview perspective. We posted them on a clipboard in the middle of the table, but then could see only one at a time. Late in the game, we posted them in order on the wall, which greatly improved their ability to see the whole picture.

Keys to Success:

This team's performance in this game demonstrated (in spades) that the wheeler-dealer entrepreneurial spirit is key to success, especially when coupled with true commitment to the

team by individual entrepreneurs and trust among team members. In this fast-paced environment extensive time for communication and planning among team members was not possible, and the preceding characteristics were needed to carry the team through. The team was successful because everyone was committed and seemed naturally to work "in sync" without much formal communication. This was possible because the individual members were experienced people with a high degree of initiative. They didn't need a lot of coaching or interaction with each other to figure out what needed to be done.

I think an additional critical success factor was that one person on the team naturally took the longer view, provided "big picture" comments/information, and periodically pulled the group back to assure that it didn't get too far off-track. He seemed to provide continuity and overall purpose.

Notable Quotes:

"Business will not go to a higher purpose....nothing happens without regs"

"We need to change the rules of the economic game. ...reward environmental responsibility"

"Seven requirements.....that's not fair!!!" (in response to first set of requirements)

"This is like drinking from a firehose!! (Early sense of being overwhelmed ...with information & speed of game)

"We need a certified lab....but National Labs are expensive"

"We all need to coalesce & find out what's happened"

"We can't give those jokers that much!!! Let's get this straight...that 5% you're giving them is \$1M I gave you" (Behemoth reminder to Electra during discussion of proposed deal---- affirmation of interdependence ground rule)

"That's life...." (when faced with a wipe-out \$5M tax....this quote as they immediately went into creative, problem-solving mode)

"A workshop????!!! I'm trying to clean up a piece of property. The feds are on my back to do it...& those guys (i.e. regulators) are IN A WORKSHOP???? I told them to get a clue!!!" (Frustration at unresponsiveness of regulators in the press of trying to succeed in business.)

"I think we need to sit him down before he makes any more deals!!!" (In response to nervousness about possible lack of team coordination, overcommitment----last AM of game, just before the team decided to call a halt & have almost their only all-hands meeting of the game).

Additional Analyst Comments - Areas for Development, etc.:

1. The buffet serving process disrupted a potentially productive strategy discussion among team members. Before breaking to get food, the team rapidly focused on sharing information about the game scenario (some members had not read it at that time) and discussing possible strategy. When they returned the discussion defocused, though they did still talk about environmental issues---both specific technologies and values-related general issues. (Suggestion: Have meal service...not buffet line to promote faster start-up through meatier first-night discussions.)

2. The team was confused about type of questions to submit for Environmental Summit. They did not understand the purpose of the exercise. (*Suggestion: clarify instructions*).
3. It was difficult to keep track of all the agreements in such a fast-paced game ----both for team access & recorder's peace of mind! (*Suggestions: Bring hole-punch & notebooks for analysts. Records post agreements on wall, in chronological order, for their team.*)
4. We all had trouble remembering which year it was, to correlate to references in notes. (*Suggestion: in addition to posting time, post game month & year on screen at front of room.*)

Requirements

Green R (Federal)

Need to provide tech and financial assurances to justify the selection of CUTS. This requirement can be satisfied by: 1) independent technical review documenting that CUTS can achieve F/S MCL's in GW and can clean soil to levels that would protect GW from leaching of VOC/SVOCS in less than 4 years; 2) financial assurance by the posting of a bond of \$8M to allow for implementation of BACT technology in the event CUTS does not perform as anticipated.

Blue Team Response:

Electra has successfully done a field test of our groundwater remediation technology. Through successful independent testing of input and output process streams the Electra technology was shown to meet or exceed state and fed requirements. The test was conducted on 11/1/96 when 46 acre/feet of groundwater was cleaned in 18 hours.

Green R (State)

Behemoth must conduct a remedial investigation and feasibility study including an independent investigation of the techniques proposed on the site for CAL/EPA review and approval. A Remedial Action Plan must then be prepared which fully demonstrates that the technologies selected can contain the contamination where containment has been approved and can treat containments to the levels specified by CAL/EPA for three parcels requiring treatment. CAL/EPA will grant variances for any demonstrations required to develop the feasibility study and will recover all costs associated with overseeing the demonstrations from Behemoth.

Blue Team Response:

Yellow team certifies that they have completed, successfully, the RIFS and RAP demonstrating an approved remediation procedure.

NOTE

CAL/EPA has reviewed the RI/FS and held a public hearing on the RAP and approved the final RAP. CUTS is hereby authorized to proceed with remedial design when approved by CAL/EPA. CAL/EPA will authorized construction of the remediation project.

Green R (State)

CAL/EPA hereby suspends its 3/30/95; 3:50 pm approval of the RAP for the Behemoth site pending an inquiry in the validity of data including the claim of custody of samples, certification status of the analytical lab and analytical QA/QR procedures that were submitted in support of the RI/FS for the site. All work on remedial design and construction for the remediation of this site must be suspended effective at 9:00 a.m. 3/31/95. Violations of this order may result in fines up to \$50,000 per day per violation.

Green R (State)

CAL/EPA hereby rescinds the suspension of its RAP approval for this project that was issued 3/31/95, 8:55 am. Before remedial construction proceeds, CAL/EPA must review and approve the remedial design for the site.

Remediation Design - Behemoth Site

- 1) Use ET electron beam cleanup method for Behemoth site
- 2) Soil monitoring will certify cleanup meets or exceeds MCL
- 3) Vacuum extraction effluent will be monitored before and after treatment
- 4) External monitoring will continuously verify no release of toxic effluents to atmosphere
- 5) Perimeter monitoring will verify no spread of contamination underground
- 6) Water at aquifer will be monitored to assure that MCL's are met
- 7) The health and safety plan in the RAP will be followed for construction
- 8) The beam will be operated in accordance with the technology plan in the remedial design

Green R (Local)

Require an EIR which substantiates the performance capability of the Electra technologies cleanup technology and advisability and all impacts of siting of 600 single family units (plus recreational facility) on the former Behemoth Industrial facility which is known to have groundwater and soil contamination.

Blue Team Response:

1) Behemoth has produced an acceptable remediation plan and with Urban Sprawl has agreed that an EIR will be produced for future use of the property; 2) it is understood Behemoth will remediate the property to residential use levels; 3) it is further understood this document does not provide acceptance of the actual remediation work to be done.

Green Team E

1. Land and water must be certified "clean" before it is transferred to developer.

Blue Team Response:

Blue team agreed to clean up to MCL residential standards as certified by and EPA approved organization. First clear 1 acre demo site. If successful, clean remaining four acres per agreement above. All acreage to be cleaned and certified before transfer to Urban Sprawl. This agreement assumes development for residential. If other use is decided, this agreement will be re-negotiated. This agreement assumes use of E-beam cleanup technology.

Green Team E

2. Demonstrate safety of the technology during operation and the residual effects after cleanup is completed.

Blue Team Response:

Agree to one acre test with public disclosure of results. Certification by SYP.

Green Team P

We want an equity position. We don't think it's going to work. But if it does, we need to benefit from this partnership.

Blue Team Response:

A contract between Behemoth and Green P has been signed transferring a 5% equity position to Green P.

Green Team P

Safety assurance on this 'star wars' technology.

Blue Team Response:

A 1-acre site at the Behemoth storage site has been successfully cleaned. Independent testing was used to verify the result of this field test.

Post-Game Debriefing: Presenter - Ben Roberts

Summary of Challenges (Behemoth/Electra)

- Commercialize E-beam technology
 - Clean up Grimesville Foundry using E-beam without resorting to BACT or BAD
 - Sell foundry site to Urban Sprawl
 - Develop new contracts for Electra
 - Improve Behemoth's financial position
 - Assure Behemoth's continuing presence in Grimesville
 - Improve working relationships with Grimesville and San Manuel
-

Accomplishments-Electra

- Increased cash from \$0 to \$7.2 M
- Obtained \$5M credit line
- Signed contracts for \$9.2M
- Projected income of \$15M for yr 2001
- Successfully demonstrated technology and completed clean up at Behemoth site
- Successfully demonstrated technology at air base

- Obtained long-term contract with air force for immediate remediation of air base and other bases
 - Diversified from a single technology company to a multi-service company
 - Developed \$200K training facility
-

Accomplishments - Behemoth

- Foundry site cleanup finished and all approvals obtained
 - Foundry site sold to Urban Sprawl - 250 acres
 - Agreement with Electra for restoration of four other industrial sites
 - Completed \$2M R&D program, resulting in new engine retrofit products for lower emissions vehicles -- increased revenues by \$8M/yr to \$20M/yr and profits by \$4M/yr
 - Increased cash flow from \$10M to \$11.5M
 - Started rehiring 40+ people
 - 5 yr. lease with Urban Sprawl
-

Company Organization

- Developed unique management structure
 - Openly evolving structure
 - High level of trust
 - Promoted ownership of projects
 - Very successful
 - No top-down control structure
 - Strong interaction between Behemoth and Electra
-

Greenville

- Developed \$200K training facility
 - Improved quality of life
 - Improved land values
 - Donated 5% to city
-

Game Dynamics

- Almost everyone wanted to cooperate
 - It was easy to collaborate
 - For us, interactions were free-wheeling and tended toward chaotic
 - When catastrophes or windfalls occurred, all the same emotions came into play
 - Team dynamics were crucial to success and enjoyment
 - Karma Kard
-

Lessons Learned

- Games underscored need to simplify regulatory process
- Getting contracts only half the battle
- Short-term focus hard to overcome
- Public and regulatory issues are critical and must be addressed early
- Technology is only one - perhaps small - part of success

Analyst's Report

People: My team was excellent. A sense of trust developed immediately, the team was well prepared and willing to trust others, no formal "power structure" evolved and no power struggles developed. Each player just went out and did their thing. However, there was a base, people came back to the table, reported in, then went forth and negotiated. It was really funny to watch the "scientists" sit at the table and discuss 3rd significant digits of costs of e-beam processing while negotiators were out making deals with much less than 1 digit of precision. However, negotiators came back to scientists and used data in some way.

Sandia Preparation: I felt your team had done an excellent job of getting ready. None of the last minute disasters occurred as in some previous cases, (maybe we are just learning). The Wednesday p.m. and night staff meetings helped and let us get a common focus. The Thursday night meeting was also good and gave us a chance to recalibrate. As rules changed throughout the process you were able to keep us informed.

Sandia Teamwork: I felt that this was also excellent, if there were internal conflicts they were not apparent to me.

Internal Media: The one irritation to some of my team was the reporting; they felt as if they could not get their message out within the games and that the focus of the reporting was being clever.

External Media: Great, we enjoyed the woman who sat in with us Thursday and the newspaper coverage in the Friday paper was a morale booster. We should always strive to have this.

Structure / Pace: Thursday morning was frantic, the deadlines were ominous, the players were trying to figure out what to do and the constant interruptions from the other teams and game control had my team reeling. However, that pace was more fun than the slowdown that occurred later Friday when it seemed we had no critically important things to do.

Karma Kards: Much better than last time in prototype game, but there was one overwhelming change that we didn't want to deal with. I was impressed with the creativity by my team and Jennifer's, when we were supposed to switch players. My team agonized, no one wanted to leave, but we all thought we had to do it, so we finally drew straws and then procrastinated on offering up our person to Jennifer. Then she had similar problems in finding a replacement and the teams came up with a strategy for not switching players. The other Kards we dealt with were

more realistic, i.e., additional contamination found, friend on panel, etc. These are probably good to add excitement, are not overwhelming, and are very realistic.

Structure: We needed a better way to keep track of agreements. We tried several "real time" approaches, none worked well. Some on the team wanted to keep all "master copies" of agreements in center of table (not with Kathleen) and then the team could use, copy etc. We did that, but it was a disaster! Wheeler-dealers don't have time to make copies and return originals, etc. We need a SYSTEM. Maybe a notebook for agreement originals, maybe keep on line, etc. Maybe game control should keep all originals and be willing to make copies as needed. It was pretty chaotic. I finally posted them all on the wall. We had 35 by the end of the 2nd day. Also, there was much confusion about who was to present to whom when. Although it was all on the single appointment sheet, which was later modified, it was difficult to figure out and we didn't know where other teams were. There were penalties for parties not being at court on time, but not for the judges, we waited a long time for scheduled hearing and lost time as we had to be there when the judges appeared---again, maybe like real life, but frustrating.

The spiral bound notebooks were great and well organized, the addenda were awful to keep track of. I made many copies of them and they always disappeared. Thus the more you can put in the bound books the better, obviously there will always be addenda.

Suggestions: I know its a stretch, but: network all computers, do all agreements on line, keep money on line, roll the Karma Kards on line, send out news updates, etc. It would be a disaster if the network ever went down, but, at the pace we play, it could help. The requirements we received, and some of the contracts were totally illegible, we got Jennifer's team to type requirements, but only after a long delay. I think we should require typed requirements.

I also think the projection of Kathleen's monitor onto the screen, as Alex and I did in the early games, could have been a big help. We generated documents on line, with all team members' real time input, and had a hard copy when finished.

The control team projected time on screen in front of room; maybe we should also have the game date displayed, i.e., "this is July 1997 (11:34 am), game ends in November, 1999 (11:45 am tomorrow)". Could also put bulletins and coming events on screen, like EPA hearing, mergers, etc.

Conclusion: Best game to date, well organized, good players. Good outcome, team met objectives, staff worked well together.

GREEN-E: ENVIRONMENTALISTS

Chronology and Highlights

Team Objectives

For the first time in my experience with Prosperity Games, this team of environmentalists took the time initially to lay out their objectives. Rich Morrison said, "First, let's get a statement of our objectives." The others agreed and began to toss out ideas that such a statement should encompass. Rich Morrison: "Zero emissions' is unrealistic. How can society function without damaging the environment?" Bob Crandall: "Damage should be equitable across generations." The statement that they eventually worked out on the flip chart was as follows:

Objectives (for the activities we would support)

- *Sustainable without long-term, irreversible environmental damage*
- *Minimal short term impact*
- *Restoration of existing damage; no irreversible effects; trade-offs*
- *Equity across various lines*

Generations

Regions

Social, Economic, and Cultural

After developing this statement, the team did not systematically review their subsequent actions to see that they were in keeping with their stated objectives, but the process of developing the statement was very important in introducing the players to each other and the game, and establishing a base from which they would operate.

Team Characteristics

The players seemed to be very characteristic of active environmentalists. Four of the five are active members in environmentalist groups. All five are professionally involved with activities involving interactions with environmental concerns. None is a "professional environmentalist," i.e., on the payroll of an environmentalist group. Each made clear his own commitment that life must go on and that often involves threats to the environment; however, those threats should be managed and minimized. One player in real life is closer to a regulator than an environmentalist and seemed to have a little difficulty with his role playing, probably due more to inexperience in that role than lack of information or commitment.

The team presented themselves as being much more accommodating toward environmentally challenging activities than stereotypical environmental activists. This was based on their commitment that they could be more effective in interactions by working with their antagonists than by immediately polarizing the situations. There are limits beyond which they would not go, but, in general, there was some room for negotiation and accommodation which should be explored first. In addition to their cooperative attitude, the players recognized that the real world is driven by economic considerations. Rich summed it up: "If something (an environmental technology or objective) is going to work, it has to work in the economy and not just in a legislated economy (i.e., driven by legislative incentives).

Team Discussions/Deliberations/Conclusions/Quotes

After developing their statement of objectives, the team's first discussion was the definition of the requirements for the Blue Teams. Here, a discomfort surfaced, in that two of the players had not really read the manual in advance and another player had prepared for a different role. They were uncomfortable with the level of their knowledge of the various Blue Team proposals, but my judgment was that they were relatively ready to contribute. However, it was apparent that they were more ready for Restore (the first Blue Team described in the manual) and progressively less prepared for the others. In developing their requirements, it became obvious that Green E Team was not inclined to be opposed to the proposed technologies *a priori*. In each case they were concerned that the Blue Teams could demonstrate their claims and defined the idea that the projects should be allowed to proceed in phases, progressing to higher levels of risk to the environment only after demonstrating on a smaller scale that the technology could indeed perform as presented. With respect to Restore, they were in favor of the technology but very strongly opposed to the proposed site. Barry Dearmond summed it up: "I like the technology and they need the landfill, but the site is ridiculous." They were also concerned that the proposals had not adequately addressed the potential consequences of off-normal events (i.e., a Safety Analysis Report).

The team at times was accused by other teams of being "too easy." I think this was due to their cooperative attitude, which I think they continued even when they came to an issue on which they could not compromise. They faced up to considerable intimidation from the ROCAR team when that team wanted the Green E Team to surrender their autonomy to a third party consultant/expert/analyst. When issues (setting aside for environmental purposes significant portions of the renovated air base at San Manuel and the acceptance of wastes from outside the county) arose, the team resisted considerable pressure from the City and Restore, and they achieved substantial concessions toward their objectives.

At one time, they considered the possibility of invoking an 'endangered species' argument to retard the progress of the San Manuel air base project. They discussed such use, and Rich summed up their position: "We don't want to use (it) frivolously because it compromises its proper uses." However, I felt that they would have used it eventually, had they not reached a suitable outcome.

During the discussions, especially the more spirited ones on the issues described above, there seemed to be very little higher level thinking. Everything was driven by very direct cause/effect, one-to-one linkages, seldom looking at issues as part of a mosaic, part of a solution, or steps toward a solution. Since environmentalists are nearly always working in response to actions initiated by others, this would be expected. However, in this game, once the pressing issues were in hand, the team turned to more forward thinking.

The Green E Team was able to work through the more urgent items and move on to important objectives (the first time I have seen this in any significant degree in a Prosperity Game). I was really impressed with their effectiveness and coolness.

Requirements

Restore:

1. Site study - hydrologic, geologic and seismic study. Evaluation of two sites and consideration of others in county.
2. Build the system in phases w/adequate demonstration of reliability and efficacy of the technology at each site, over the life cycle, including monitoring and public access to data.
3. Additional requirement through Karma Kard: Will not import waste from outside the county
- no hazardous waste to landfill.

Babco:

(Siting should not be problem here)

1. Build facility in phases w/adequate demonstration of reliability and efficacy of the technology at each step over the life cycle, including monitoring and public access to data.
2. Demonstrate responsible operational procedures and ability to restore site in the event of failure or accidents.

ROCAR:

1. Build facility in phases w/adequate demonstration of reliability and efficacy of the technology at each step over the life cycle, including monitoring and public access to data.
2. Prepare EIR which addresses consequences of all credible accidents, failures, and potential new toxic emissions.

CUTS:

1. Land and water must be certified clean before transferred to developer.
2. Demonstrate safety of the technology during operation and the residual effects after cleanup is completed.

Post-Game Debriefing: Presenter - Joan Holtzman

Goals

- (1) Sustainability
(development without irreversible environmental damage)
- (2) Equity across various lines
 - generational
 - regional
 - socio-econ/cultural
- (3) Restoration

Assessment of Interfaces

- (1) Some “real”; other less so
- (2) Personalities count
- (3) Allowed for positive teamwork

- (4) Allowed for good delegation of responsibilities
 - (5) More than enough \$\$ to accomplish goals; i.e. costs less than \$300K
-

Frustrations

- (1) Weren't properly prepared to do requirements
 - (2) Too much going on at same time (too many cases)
 - (3) Yellow and Green R teams unavailable
 - (4) No enough experts on various teams
-

Successes

- (1) Achieved (in principle) all requirements - with some painful concessions
 - (2) Green, open-space set aside and restoration on closing military base
 - (3) Wrote language for certification bill - which passed!
 - (4) Derailed gutting of the EPA
 - (5) Got million \$\$ bonus for training in sustainable jobs
 - (6) Achieved successes without resorting to litigation or bribery
-

Issues

- (1) Safety, viability and impacts of new technology
- (2) Promoting supportive regulatory and legislative structure
- (3) Protection of estuary, ocean and adjacent land eco-system
- (4) Restoration of damaged land areas
- (5) Unacceptability of imported garbage
- (6) Protection of threatened/endangered species

Analyst's Report

Areas For Improvement

In our summary, we took credit for writing a bill about the certification of environmental technologies. The Regulators took exception to our claim, saying that they had written it. When we heard that the Legislators were to hold hearings on the bill, we sent a lobbyist to represent our interests. He returned to say that the bill had not been written, so we wrote one very quickly, and it was passed. What did the Regulators think they had written? If they had written something, why were we told that the bill needed writing? We had no intention of invading the Regulators' turf.

The approach of this team of environmentalists did not result in any lawsuits. Such action would have been the result of failures to reach their objectives by more cooperative means, and in this game, there were no such failures. The same was true in the prototype. If we want lawsuits, perhaps we will have to insert them into the game explicitly.

The players indicated that the amount of money available to them was unrealistic. Apparently, the luxury of hiring a lawyer/lobbyist was a new experience.

Personal Information Useful In Future Games

The intensity of this game was substantially better than my previous experiences. There was a time of almost frantic activity (and there probably should be some of that in a game), but there was more time in which actions and reactions could be given a reasonable degree of consideration before execution.

Analyst's comment re Environmental Summit: In all the discussion, it was implicitly assumed that 'beyond compliance' is always good. The whole concept of risk based regulation is that there is a point of diminishing return. There needs to be a development of ALARA and cost vs. benefit assessment to be applied to environmental issues. There needs to be some kind of risk assessment to indicate that more stringent requirements or achievements beyond requirements indeed produce significantly reduced risk. Performance-based standards would be better than technology based compliance, and incentives are OK when they produce lower risks, but simply pursuing 'beyond (or higher) compliance' goals may result in misdirection of effort/resources. Would it be higher order thinking to consider as a group (1) compliance, (2) beyond compliance, (3) performance based standards, (4) risk based regulations, etc.? When these are considered one-by-one, we can be led astray into inequities. For example, compliance to higher and higher standards without regard to reduced risk will waste resources on improved compliance without really improving health, safety, and environmental protection.

Another observation: Our society has a fundamental problem--no way to determine real social costs for goods and services and attaching those costs to the goods and services. Is government (tax and provide incentives) the only solution? Benefits of improved environmental performance are often not accrued in a way to encourage developments of improved products and processes.

The fictitious names of companies, towns, etc., can connote a prejudicial evaluation that the team has to overcome, e.g., Urban Sprawl and Grimesville. Be careful when that is not the intent.

With the level of instruction/discussion about higher levels of thinking, the responses to innovator questions were overly influenced by the tie to time horizons. Specifically, the environmentalists were looking at tens of years horizons, so they responded as thinking at higher levels, but I don't think they really were.

GREEN-P: PUBLIC

Chronology and Highlights

Team Objectives and Characteristics

Though the objectives of the Green Team-Public were not articulated, much of their deliberations focused on jobs, jobs and jobs. They also seemed interested in assurances that they are protected against worst case scenarios (e.g., Love Canal and Bhopal-like situations). Although the "Quality of life" issue was brought up at the beginning, the team never articulated what that means to them, and issues of economic development, jobs, training and money-making dominated the discussion and took over the team's attention.

The team began with six members. However, early in the game because of a Karma Kard, the team lost one of its players. Team members represented a continuum in their abilities to deal with the issues from those that seemed somewhat overwhelmed, those that were comfortable with the process, and those that were thriving on it and enjoying the role playing.

- Two are very outspoken, and are more interested in making deals rather than compromising and building alliances, independent minded. One was very interested in developing a vision, building alliances and thinking long-term, but could not follow through; she continued to push for win-win solutions and for collaboration and cooperation. Fourth is more interested in technology, moderate.
- The team as a whole seemed risk-averse, and demanded assurances to protect against technological and catastrophic failures.
- Team members quickly assumed special interest group causes—minorities, labor; neighborhood representative, etc.

There were some attempts at taking the discussion to a higher level; however, with time pressures and team composition, the team mostly operated at "level 5—Seize the Day." Everyone seemed to be having a good time. The team was also very creative; they formed several entities including: GOD (Grimesville Organization for Development); CST (Committee against Suspect Technology) and EnviroLink, and used these to benefit the communities.

Team Discussions/deliberations

On Wednesday evening, team members went through brief introductions and began discussing how to organize? whether they should divide according to the two localities or work together as a team. It was brought up that the team needs to come up with "win-win" situations. This led to a discussion of what is "win" from the public perspective. Areas such as jobs; enrichment of the communities; quality of life, and the need to consider long-term versus short-term focus were discussed. Other questions were raised including: what are the trade-offs; can the team members be bought? and how to assess the disparate impact on the various community groups.

In general the group felt that Public is generally educated and that they will not "put up with anything that affects the quality of life." However, it is often the case that there will be disparate impacts on different groups and that every group tends to want something different. The team adjourned on Wednesday planning to work together as one team, though each will represent their own "persona." It was also clear that the team members' knowledge of the scenarios and roles of the various teams varied considerably, they all agreed to read the manual carefully before they resumed the next day.

In the morning, they began discussing roles for each team member, and to define the requirements for each of the four companies. They debated whether they should be concerned with the environmental issues or should they let the environmentalists handle it? The team decided that they will focus on jobs, and community impacts and let the environmentalists and regulators handle their issues.

While the team was still trying to organize, requests from the two mayors for meetings forced the team to begin assigning roles. They decided to have a person representing the "rich" Country Club and the established residential neighborhoods. A second person to represent the low-income and minority concerns. A third representing labor; a Chamber of Commerce, a representative of schools and social services and community activists.

With the time pressure, they split into two sub-teams one for each community with the understanding that team members will move among the two sub-teams. The sub-teams' approaches varied. While one sub-team attempted to recall the mayor and to make deals, the other sub-team tried a more straightforward approach and in the process frustrated one of the entrepreneur teams since they kept emphasizing quality of life with no specific demands to which the company could respond.

A Karma Kard forced one of the team members to move; in general the team was not happy about that, especially after they had assigned the roles. It was decided that the person representing the Country Club neighborhood will also assume the responsibility for schools and social services.

Much of the team's requirements focused on jobs, gaining equity in the companies, and concerns about Love Canal and Bhopal-like scenarios. Entrepreneurial teams responded differently to the Green-P requirements. While some refused sharing equity, others went along. Some members of the Public team felt that some of the companies responses were unrealistic.

Also Green-P tried to forge an alliance with the environmentalist team. In general, their attempts failed. Public felt that the environmentalists were not stirring things up and that they were "going along" with the companies' demands.

Later in the afternoon, the sub-teams began to merge. By the end of the day all companies except for Big Oil had met the Public requirements; so the team was operating as one. At that time, part of the team was ready to sue. Over dinner, at the urging of one of the members who wanted to reach a compromise, the team agreed that they will meet with the mayor early in the morning to explore options other than going to court.

On Friday, the team was asked to go ahead with filing a court case against Big Oil. The team as a whole was having fun, going on strike and hiring an attorney. Although, the one member who was for a compromise made it clear that she was not happy about it. She said, "It is out of my hands now; I'll do what I'm told..." She continued to be an active participant.

Going through the court proceedings, team members raised concerns about the realism of some of the rules. They went to Control with their request, and after several attempts got an approval.

In general, the work load in the second day was light. This generated several comments. While some felt that the game could have been done in less time; others appreciated having the time to network with other teams.

When all the negotiations were done, Green-Public had made a considerable amount of money. Much of it was directed to the two organizations: GOD and Envirolink. Two observations: after the court case, the team settled for almost the same amount they were originally offered by Big Oil on Thursday; and the team felt that the money situation was not very realistic for a Public team.

Post-Game Debriefing: Presenter - K. C. Bishop

Strategy

- Agree on general goals
 - Trust to work in parallel
 - Work cooperatively
Win-win
 - Used our resources effectively
-

Restore

Goals

Location	20 year commitment
Quality of life (\$)	Location
	Trucks (hours and transfer station)
	Hiring for minorities
	1M shares to Envirolink +

ROCAR

1400 jobs	Advisory committee to review
Safety of process	Stayed
	\$1M if they leave
	\$800K to Envirolink
	Training for Clohi.....for big manufacturer

Envirolink

\$800K (ROCAR)
\$3.5M stock and \$250K/year
\$100,000/year (ROCAR and mayor)

San Manuel

Near scenic Turkee River
200,000 people
18% unemployment
High tech leaving

Big Oil may go to Korea

Goals for city

Quality of life (long and short term)

Keep jobs

Add jobs

Envirolink

Public/private partnership for industrial development

Grimesville
aka Green\$ville

“The” Public - tax break, loan program, labor, minorities, business, suspicious, rich people,
“tax”, education, etc.

75,000 residents, 15% unemployed people want retraining, exodus of young

Goals for town

Quality of life

Jobs - retraining minorities

The “mayor” problem - helped her

Greensville Organization for Development; education, parks, training, matching funds, etc.
\$250,000

Babco

Goals

Equity

5% after tax

Minority hiring

Sustainable education fdn.

Financing - \$20M + \$5M

Clohi training to
move

Trained workers
Moved into redevelopment zone

CUTS

Low income
Equity

5% of Electra

Rezoned.....

IRS problem Legislature to regulators
worked with Enviro's

G.O.D. & Education Foundation

5% Babco \$2M (matching)
 \$5M Babco Benevolent Association
 5% of Electra

Analyst's Report

- Not enough time for the team to form and norm before they were expected to perform.
- Not enough time to understand the differences between the four companies and the technologies they represent.
- The team viewed the rule for not having the option to change the requirements that they set early in the morning on each of the companies as being unrealistic
- The team prefers that when a company comes to talk to them they should discuss both requirements at once rather than one at a time. And they did so.
- If the team has to split as happened here, one recorder is not enough.
- Scheduling of news conferences and hearings at times which conflicted with prescheduled meetings between public and the entrepreneur groups was somewhat disturbing.
- No opportunity to compare and contrast between the different communities, and to consider issues such as having a technology certified in one community not have to be certified in others.
- Though there were attempts to move to a higher level approach to decision-making the team split and was driven by level 5 thinking. Those that tried higher level thinking did not reach closure, the rest of the team—level 5 thinking— came to the rescue to close the deals.
- Teams that meet for the first time with no analytical support will more likely not think strategically, define alternatives or contingencies, or consider any alternate paradigms.
- The five years time horizon was not well understood. The team in general was not aware of the time change and of the fact that new legislation and bills had been passed.
- No opportunity to force people to think "outside the box". People behaved and operated the same way they normally operate.

GREEN-R: REGULATORS

Chronology and Highlights

March 29, 1995

During the initial dinner meeting, the players had a very lengthy discussion on how the team should be divided. It was difficult for a few of the players to agree to play a role "outside" the role they played in real life. Each gave an overview of the regulator's role and the work they were involved in. It should also be noted that one of the players had not read the book in its entirety. This held the other players up a few times at dinner, and throughout the game. It was stated in the handbook they should divide into three subteams: Local, State and Federal, but the issues of media (i.e., air, water, land) came into play. They discussed splitting into different media, but determined this would not satisfy the requirements of the game. It was finally agreed they would separate into three subgroups: Local, State and Federal. Each subgroup would set requirements for each of the four Blue Teams, with the option to give one Blue Team two requirements. A major goal would be to set up a "One-Stop-Shopping" permit center.

In particular, Nolan and Giardina started out with a push for one-stop shopping. Blevins recommended a memorandum of understanding (MOU) between multiple agencies. There was discussion within the group about whether they should just start the game out with one-stop shopping for regulatory services. There was some discussion of existing initiatives in California. The final conclusion (with some Control Team input) was that the regulator team needed to start out with reality as it currently existed but could change or evolve as the game was played out.

There was general recognition of the difficulty of the current regulatory system with multiple stops (maybe 40) at the present time. The group then became concerned with how they could represent this complexity with only three or four groups. Quote: "A landfill could not be permitted in California within five years" given the multitude of approvals required.

The group dynamics were positive. It was a friendly group. There was some difference in group dynamics between the late comers and the four who showed up on-time.

There was sincere recognition of the complexity of the existing regulatory process and the difficulties that the regulated face.

March 30, 1995

It was determined that the Green Regulators would split into three subteams and would be called: Local Regulators, State Regulators, and Federal Regulators. Each subteam would set their own requirements without input from the other subteams members.

The issue of having multi-media was never fully closed and how it should effect the requirements they provided the Blue Teams. Water is perceived for Blue Team #1 to be their biggest issue. The State declared they should focus on water quality, financial assurance, and groundwater contamination requirements.

While the subteams were setting up the game plan, the City of San Manuel wanted 5 minutes to present their views to all regulators, before requirements were set. The team decided they wanted 45 minutes to discuss requirements among themselves first and wanted more information as to what San Manuel wanted to discuss. The Fed and Local Regulators set up their meeting times, but the State set a different schedule.

The discussion went back to media. "Are the media going to be split? Each subteam will take a shot at whatever they want. Air is a big consideration. Should locals be responsible for air and state for siting, (they don't have the authority). Locals stated that they would consider land use in their requirements. All decided they should play it honestly. The requirements should flow from each individual's experience and apply to the issues.

The issue of how the agencies obtain money in real life was discussed. The following points were covered: agencies are funded by charging fees and this is how staff is paid. Within context of game, the regulators can submit bills to legislature, free of charge, with no other requirement to cover costs.

Meeting with San Manuel/Air Force (Purple Team) and FEDS:

Mayor of San Manuel notified the subteam that it has formed a partnership with the Air Force. A depressed local economy, coupled with high environmental concern are issues. San Manuel supports Restore, and will work with them to bring the landfill into the community. To do that, they want to make sure that the regulators are together on this and will have an agreement, provide a one stop permit center, and allow waivers from DoD.

It was proposed by San Manuel that all parties work as a team. "The City and the Air Force believe the technologies are unique and want to get the new technology demonstrated in public. We need your support and to know what the regulators' concerns are. The site is polluted, remediation technology will be tested on a public property, success or failure will be tested. We need permits to get technology in the field and to start work on the problem. DoD is interested in the cleanup technology and wants to get it out to other bases throughout the US. San Manuel had been designated as an empowerment zone by the Federal government, has the right to waive all requirements, within the base area also, and in base areas when its turned over to the city. Our main concern is to get the base cleaned up, and Restore is the key to this. RESTORE is open to changing or moving the site off the base but the City wants to utilize the base area. An environmental group is interested in our making progress but they clearly do not support the first site. There could be a land trade off."

The regulators gave the following suggestions: "Set up a bond for the landfill to be closed properly in case something happened to Restore. They would have to go to a bank and get a bond. It should cover proper closure, accidental release, etc., and also might add financial assurance for cleaning up the Air Force Base. It is a very expensive place to be conducting business of this nature because it is on an estuary. It could be more than they can handle because of the estuary and being close to the ocean. It's very dangerous. The City is only saving about \$2M by getting free land."

All requirements for the Blue teams were submitted on time to control team.

While waiting for further action from the Blue Teams, the three subteams decided to act as one group with their goal setting by holding a summit meeting on the patio. The team convened outside to discuss future goals for the game. The specific topics were:

1. Green-R would develop joint goals, including a one-stop-shopping demonstration on the Restore project.

2. They would push for expansion of the existing technology certification program. The expansion would be to all media and to serve in place of all state/local permitting requirements that do not pertain to land use/sites and which are not unique to protecting the health and safety at a specific site. It was recognized that the Feds do not have a certification program even though the state (California) does.

3. They would push for the legislation needed by the Feds to prepare a national certification program and have California serve as a pilot. "Barbara Boxer will push it."

Note: The group was very collegial in its discussion. All parties contributed to the discussion and no one individual was dominant. The team members did not have the egos typical of top echelon administrators/CEOs. They were able to work as a team.

4. State legislation was also drafted. Money was an issue in each of the proposed bills. Funding was stated as being required to implement the legislation after it passed.

A total of three bills (one Fed. and two State) were prepared. After the retreat ended at 10:30 AM, the group divided and went and talked with the legislators. They were dispersed into six individuals acting alone.

Blue teams started meetings with Regulator subteams to discuss requirements. The following are summaries of these initial meetings:

Restore:

State

RESTORE has decided to move the facility north. The route for the trucks will be on the highway but still on the Air Force Base. This has been agreed to by DoD and by the city of San Manuel. RESTORE is entering into an agreement with DoD and San Manuel; each will pay part to have a consultant verify the technology and landfill performance. The agreement has not been finalized yet.

The State regulators recommended that future work includes a new geologic analysis. The State does not know what the status of geology is in the new area. They need to know the capabilities of the consultant. State needs to know the capabilities of the contractor doing the analysis in order to proceed with signing off Requirement 1. The state needs assurance that the analysis is substantiated.

Feds

The discussion focused on the bond and financial assurance issues. The meeting was short and cordial.

ROCAR:

State

The issue raised by the ROCAR team (represented at the meeting by Big Oil and Clohi) was the need for certification from Cal/EPA (State does not have a certification program for treatment technology) ROCAR is not proposing to treat hazardous waste. The process would be permitted as air control technology. If the state extends the certification program to include air control technology, ROCAR would apply for certification that would be suitable for air control devices.

Pending legislation is in process to cover all media. As the regulators understand it, ROCAR will apply for this coverage. Data will be collected by an independent lab and would be submitted for certification.

In discussions with environmental and public groups, they all need to agree on a qualified lab. ROCAR will report back. Regulators will have the power to veto if they do not agree. Regulators cannot recommend anyone. "Does it have to be a Cal. Lab?" Regulators answer is no, but the lab would have to be able to meet the state's standards. The regulators recommend going with an accredited program, and using a lab with a certified EPA program. ROCAR would be in a better situation using a Cal lab because they would be familiar with all requirements, etc. If cost became an issue, the independent testing organization may not be a California lab, but a lab that has California experience.

Local

ROCAR would like to keep the local regulators abreast of testing program with Sandia and to inform them of progress. The Local regulators stated that it was helpful to understand progress, but ROCAR should keep the State informed also.

The local regulators stated that it is very much in ROCAR's interest to have their process certified.

Locals need a certified air program and a pilot program is about to be started. ROCAR would be the first, and when a certificate is presented, then the Locals will sign off on their Requirement.

ROCAR will go back to discuss the situation with Urban Sprawl and to enter into an initial agreement to satisfy the requirement. Local regulators will accept a two part environmental impact report process as long as in the first part it is clearly stated what ROCAR is doing. For the initial phase it was recommended to use a residential standard as a basis for the cleanup. Then if the technology works, ROCAR would need to determine what are the impacts on a 600 unit site.

Feds

A discussion occurred between ROCAR and the Federal regulators on the proposed approach to meet the Federal regulatory requirements. The ROCAR representative came forward to see if the regulatory team had any suggestions for addition/expansion of its proposed approach before they got too far down the implementation path. John Schofield proposed using Sandia as an independent source of information and modeling on the process. There was an agreement that ROCAR was on the right track for meeting the Federal requirements.

CUTS:

State

Behemoth Engines: (property owner) has full and total responsibility for the land. Behemoth is in the process of preparing a full remediation plan, comprehensive site assessment, including technology. An environmental impact report will be addressed. CUTS is working with Urban Sprawl to determine the future use of the land. They need to clean it up and have certainty that everything is certified for whatever use is intended. They want to develop the property as an urban site and make sure it is cleaned up to those standards.

Electra is going to be demonstrating at the military site adjacent to San Manuel and put together a complete plan to satisfy everyone: local regulators, environmentalists and Cal/EPA. They must be able to verify that the technology is suitable as it is planned to be used.

A demonstration is being negotiated now and will be completed within next 6 months. In a worst case scenario estimate, it should taking 1-2 years to get test results back. Doing the remediation in a quick manner, the site could be cleaned up within a 4 year time frame. Behemoth feels 5-7 years is more feasible but they feel have a sense of urgency.

Relative to the status of negotiations with Urban Sprawl, Behemoth is still defining requirements for the next 3 months and they hope to have a deal structured to define their interest, the money involved, and when they need the site. They hope very shortly to have a deal structured.

Local

The local regulators stated that no title could be transferred until property is back to normal. They wanted to know who is responsible for the environmental impact report? An expert will do this under contract from Behemoth, but they have responsibility. A final environmental impact report will have to be done through Urban Sprawl.

Feds

Peter Boissiere presented what CUTS has done with soil. The Feds stated that results for groundwater still need to be obtained. If the results are as good for groundwater as they are for soil, the amount of bond required is expected to be lowered. Agreement is expected soon.

Babco:

Locals and State

Babco didn't show up for the 1:00 meeting. No contact was made by Babco or Local regulators. Due to having only three people on the Babco team and trying to do too many things, Babco had

gone to the wrong Green Team and did not realize it until 20 minutes later. The state and local regulator teams were not too forgiving.

Feds

Babco's desire was to explain its process to the regulators. Babco committed to "overkill" its technology and processes to assure no releases. They will use a mass balance to assure that they are not making releases to the environment. Data will be proprietary but an independent verification will be a part of the process. Emissions will be limited to parts per billion. It was a cordial meeting.

Members of the Green-R team became more involved in lobbying.

The afternoon session started with a press release and radio announcement. (Note: some of the Blue team discussions reported earlier with the different regulatory subteams took place immediately after lunch). The California State subteam was upset because their press release was ignored, misquoted, and not credited. Allen and Edgerton complained to the Control Team. There was an expectation that the press would accurately report things.

It was decided that it was time to reconvene the Green-R summit meeting between regulators outside on the patio and to continue discussing goal setting:

The State subteam briefed the Fed and Local subteams on the pending Legislation and how their discussions went. The Fed subteam had also held discussions with the legislative team to give them their views on the FED-EPA and their future goals.

There was debate over the Federal bill. There was support in favor of the bill for certification. Questions were specific and answers were specific, (e.g., it was asked what certification meant and it was established that it was the approval method for establishing a pool of knowledge.) Regulator subgroups met with Green-public, finance group, Babco, and got them to send representatives to speak in favor of a bill in the Legislature. For example, Babco would solicit other industries to speak in favor of national certification and the Mayor of San Manuel would speak in favor for local communities.

Schedule for legislation was not known at this time.

A wrench was thrown into the group by the fact that CUTS drew a Karma Kard that a member of its team needed to exchange places with a regulator. No volunteers stepped forward and when straws were drawn, the person who drew the short straw refused to go. Green-R has evolved into a group where the individuals like their roles and want to work together. The job of pushing legislation appears to be particularly appealing to the individuals on the team. Even the fact that they were asked to have someone leave had a somewhat numbing negative effect on the group. An agreement was signed with CUTS to delay the transfer for five years (a time frame after the end of the game).

The group broke into a few subgroups for varied discussions too diverse to follow.

The group came back to review where they were and to prepare topics/information for the economic summit. The group reviewed the status of the Blue teams in meeting their requirements. In general, there are no requirements that appear to be large problems. The regulators were surprised at how slow the Blue teams were at closing out the requirements given the relative ease in doing it at this point. "It's not the regulators that are slowing down the process."

The issue of local control came up. The local subgroup wanted an ability to implement more stringent requirements in cases where local situations justify more restrictive requirements. This became the first issue that created dissension within the ranks of the group.

The summit meeting was interrupted by a Red-J/L team player to inform us the Local regulators were being arrested on pending charges of corruption and accepting a bribe. The summit meeting was adjourned.

In the meantime, the Fed-R had meetings with some of the Blue Teams to discuss their requirements, and to send them back with further information to get these requirements passed. It was my impression that the Fed-R team wanted to make sure all the requirements they set were being met.

The Green-R team drew its last Karma Kard: "You may add one additional requirement for a designated Blue Team. There was no consensus discussion on this and the best of the analyst/recorders recollection, the Fed subteam just went and acted on it. The State subteam went off to have their workshop.

3:05 PM Cal/EPA workshop.

The workshop started slowly but built up a large number of participants (7). Most of the discussion focused on a proposed bill to facilitate the prioritization and certification of technologies. The issue evolved from a government appointed council to just tasking Cal-EPA to use an appropriate process. The solution would allow for use of an industry council such as the Environmental Technology Partnership.

The supplier group (Yellow team) reviewed the legislation that they were trying to push through. The discussion then focused on this legislation proposed by the supplier group to establish a test site on the San Manuel location. This \$3M industry legislation was viewed as potentially threatening by the state subteam to their own proposed legislation. Lynne tried to facilitate the creation of a win-win between a combination of the Cal/EPA and supplier position.

This was a period of particular chaos as Blue teams wanted requirements signed off. For example, ROCAR came to the state regulators to argue its case for alternatives to meet the 2% zero emission vehicle goals. There is no assurance that all of the agreements and signed forms will be collected from the game process.

The newscast was followed by the economic summit.

Economic Summit

The issues presented at the economic summit are the following:

1. The establishment of uniform national standards based on health risk.
2. Should we create an incentive-based compliance system.
3. Loan program for urban areas.
4. How do we protect from get rich quick environmental companies.

There appeared to be strong support for a uniform technology certification program.

March 31, 1995

The day started out much slower than the first day. Restore came and had their requirements signed-off by the Fed regulatory subgroup. There was some confusion about the "one-vote" Karma Kard and how it had gotten the local regulators out of their legal problems.

The group started this morning out functioning as three separate entities. The Feds sat at one end of the table and the state representatives at another end. The locals were not even at the table (they appear to be off speaking with the press). This is an interesting dynamic because the group very much wanted to work towards "one-stop-shopping" but seemed to naturally function as separate independent groups.

The locals (Gary and Paul) were working to get their name exonerated from their arrest on the previous afternoon. They traced their problem to a representative of Urban Sprawl and came back to the GREEN-R table get support in a united action against providing permits to Behemoth.

The Local regulators decided to file a lawsuit against Urban Sprawl based on documents obtained under a Freedom of Information Act request by San Manuel Environmental Health and the USEPA office of Criminal Investigation.

ROCAR came with the requested information needed to meet their requirement. The Fed regulators wanted them to go back to the Yellow team to provide independent verification of their mass balance. ROCAR balked and said it was going to cost more money. The Fed regulators said it did not matter and to have Yellow give them more documentation.

ROCAR came back to the Fed-R subteam to submit a contingency plan to meet the regulatory requirements. Documentation was submitted in the form of an agreement between ROCAR and the Yellow Team.

The ROCAR requirement was passed by Fed subteam. Submitted agreements were okayed.

Babco approached State subteam to finalize their agreement. Babco indicated they were taking initial delivery from their German Co. and they still have not started production in local plant. The state subteam wants the German plant inspected to verify no regulations are being broken. Babco needs to get a credible 3rd party to verify that State allowed variances are being met. An addendum was written on the original requirement and signed by both parties.

Babco is still having problems getting the final requirement from the State-R. There seems to be a lack of understanding on Babco's part that the state needs to have the German plant inspected.

In a joint announcement with Local, State, and Federal Regulators, it announced that Federal EPA Administrator Browner had suspended all permit issuance until the Legislature can pass HR-1995-1. It has been pending for over three years.

The Green-R team also issued a violation against RESTORE. Because of the violations, RESTORE must cease and desist all activities at the landfill until an acceptable cure plan has been submitted and approved the Federal and State regulators. Restore has 90 days to comply by presenting an acceptable cure plan. A \$25K/day fine was assessed for any time past the 90 day limit. Fines for the initial violations are being assessed the amount of \$1M.

The meeting between regulators and CUTS on a suspended requirements approval started with a discussion of the issue. An allegation was made that one of the labs may be falsifying data. A US EPA investigation indicated that Urban Sprawl (associated with Behemoth) may be involved with data falsification activities. The suspension was issued until further information is presented to indicate that there was no wrong-doing at the Behemoth site. Requirements were put forth that the lab supplier needed to meet in order to exonerate itself. The lab supplier had only done a historical survey for Urban Sprawl. The laboratory will provide a copy of the report it provided to Urban Sprawl and will allow an audit of its books.

The State regulatory subgroup was involved very heavily with the Red-L team in trying to get legislation passed. The State subgroup also had a very difficult time passing the requirement they set for Babco. One of the team members was very involved in the legislature and kept passing the Babco team over to the other subteam mate.

The Local subgroup was very involved in getting campaign contributions and getting their good names and reputations cleared. They had passed all their requirements.

The Fed subgroup also passed all requirements, but gave Restore a very difficult time with some of the responses to the requirements they gave back. The Fed subgroup decided to place another requirement on Restore which extended their playing time.

The State, Fed, and Local regulators started coming together again and working more cooperatively. However, some of what may be going on may be an attempt at better gamesmanship rather than accurate or realistic action. This fleeting attempt to work more closely was followed by a period of multiple parallel activities by the individual subgroups. It is particularly interesting that at the start, the facilitator almost had to pry the one group apart into three subgroups because they wanted to work together and push for one-stop shopping. Once the three subgroups became autonomous with some degree of individual power (e.g., the ability to place requirements on others), they functioned separately. This seems to be a common trait relative to bureaucracies in that despite good intentions, once individual power is tasted it is difficult to

pass up. The facilitator frequently suggested that the team come together to work on goals, legislation, etc. however, no real action was taken on these suggestions at later times in the game.

The US EPA performed an inspection of the Restore landfill and issued a cease & desist order.

The news broadcast occurred and the year 2000 started. (Start of Session 6)

Meeting Between Restore and the Regulators

Restore claimed the regulatory inspectors were drunk. The Fed subgroup stood behind its findings. Restore brought no information but just argued with the regulators. There was no information subsequent to the Fed actions. The meeting broke up with an explanation by the regulators of what they needed to have their suspension lifted.

The group continued with individuals/subteam dispersed on different tasks. Lynne Edgerton remained very focused on new legislation.

A Local regulator (Nolan) received a \$100K campaign contribution from Urban Sprawl.

A press release was announced that indicated pending legislation to abolish EPA.

Requirements were being signed off.

The State regulators collected \$5M in appropriations from the legislature.

The Local regulators received an undocumented \$100K campaign contribution from Electra.

The Local regulators received \$100K campaign contribution for a signed agreement with CUTS.

LUNCH

Observation by Jim Allen: There should be a role for intermediary companies (e.g., CH2M-Hill) that typically are major players in the process. These intermediaries are sometimes much more risk averse than the small and large organizations that were modeled in the current game.

Preparation of Summary for Wrap-up Session:

Goals tended to focus on legislation to achieve one-stop shopping. Other than signing an MOU to cooperate between the Feds and State, there was limited action to achieve these goals by alternative means. The Locals did adopt a strategy of running for office in which they made the major plank in their campaign a one-stop center for technology certification.

Lynne developed a series of vugraphs that focused on state actions that she had concentrated on.

The GREEN-R group got together to prepare the out briefing. The group seemed to think that it worked together better as the game was played out.

“Agencies are criticized for not having a vision, but they do have mission and cannot make it happen because of the day-to-day pressures.”

Requirements

BLUE TEAM	LOCAL	STATE	FED
Restore	Moved facility PASSED	Passed required a field process they wanted to avoid a demo OK proceed, would agree to a restriction on a solid waste permit PASSED	OK on type of financial assurance May relocate site(8M will go down) Will make sure DoD provides assurance of clean-up w/city PASSED
Babco	Requested documentation for 4 9's PASSED	Not convinced they had enough data for req. for facility Tech used is adequate? Need more data (adequate pilot data) PASSED	OK on Req. will provide "CONFIDENTIAL" PASSED
ROCAR	Pilot program on Cert. PASSED	Allowed to go into Haz Waste cert. program (hasn't waived, but will allow them into the program by proving PASSED	Will perform MASS BAL Sandia is u Independent. Lab MIT needs only initial Give EPA 1) computer model 2) Contingency plan PASSED
CUTS	Need Info PASSED	No agreement, probably not a problem, do a demo at the air base and staging site on Electra tech before they started feasible study. PASSED	Need info PASSED @ 3:13PM

Post-Game Debriefing: Presenters - Lynne Edgerton & Jim Allen

Regulators Report (3 teams were formed - USEPA (Federal), CAL/EPA (State) and Local/Regional Regulators)

KEY ISSUES & GOALS

USEPA, CAL/EPA and local regulator teams all agreed that we needed the following:

- One stop permitting CA centers
- Federal USEPA environmental technology certification program, with first step as CA pilot env tech certification program approval
- Expansion of existing CA environmental tech certification program to include solid waste and water

CAL-EPA Goal Only:

- United multi-media integrated pollution prevention strategy

HOW DID YOU INTERFACE?

Within Regulated Community?

- Better than real life
- Cyclical: cooperation on company-specific well; recurrent issue was how to best respond to local insistence on control of standards, but worked out; cooperation increased; supportive testimony in CA Legislature and Congress

With Blue Teams

Regulators were more supportive and helpful than real life. In real life you have more regs, and you have consultative engineering consultant firms interface in real life (they are usually conservative)

With Legislators?

We thought they took too long, but they were more helpful in CA than Congress.

Great action at state level- what was done was good. Also, finally, in Congress.

With Environmentalists?

Rarely saw them. Had no input from them on CAL/EPA legislative language submitted to assembly, and, in all honesty, cannot quite see how the Env. Team can claim it "wrote language" for certification

WHAT DID YOU LEARN?

USEPA: "Reality of game corresponded to real life, favorable--pretty accurate.....and surprising"

CAL/EPA: "That the press of daily permitting decisions and constant demands make it very tough to stand up in a proactive way. Moving in legislative forum had large cost in that it resulted in inflicting more delay and less responsiveness to citizens and business"

Local Regulators: "Stress of system bogged us down and made us live day to day"

USEPA: "We have the vision but have structural difficulty implementing it"

Nota Bene:

Great pressure to "pass" ⇒ perhaps reflective of current political atmosphere ⇒ but must remind that regulators will not pass projects which do not meet statutory criteria, in the end.

LIST OF IMPORTANT EVENTS AND ACTIVITIES

All technologies--Blue Teams--were passed within the five years

All technology certification program legislation passed, both at state and federal level

Multi-media certification program was implemented immediately after legislation passed (solid waste & water)

Funding in CA approved for program and for testing center and small business assistance

Federal funding for USEPA program approved.

Proposed in late 2000, but not enacted due to time expiring, optional one-stop unified environmental permit authority

Interface with legislative bodies and business representatives was by far the most active.

Notes

USEPA threat to Congress almost derailed national certification program

Fair and equitable processing of env. cert. application in CA almost derailed bill

FUNDS COLLECTED

- \$7M from legislation
- \$400K from settlements
- \$500K in campaign funds
 - Urban Sprawl
 - Behemoth
 - Sharks Unlimited
 - ROCAR

CAMPAIGN PLATFORM: GARY NOLAN and PAUL GIARDINA

- Establishment of the technology certification process
- Establishment of the one-stop permit center
- Recall of natural resources committee of the legislature because of lack of expeditious action

Analyst's note:

The regulatory process and regulators were criticized by the Blue teams even though the regulators were frequently not the problem. In the opinion of the analyst, the regulators tried very hard as a team and individuals to be responsive to companies.

The environmental activist team thought the Green-R team was unavailable or too busy but the analyst did not remember any times that they either made an appointment or tried to see the Green-R team.

The Green-R team worked within their familiar paradigm.

Analyst's Report

The Green-R team had good intentions to work at a higher level but seemed to get stuck in a "carpe diem" style. They wanted one-stop shopping and at several times came together to initiate actions. Unfortunately these seemed to quickly fall apart in the immediate pressures of their daily work. Perhaps this is a "regulator's dilemma". The individuals were all well intentioned and capable of operating on a higher level but the daily "crisis" pressures of their job prevented them from being able to operate on a higher level.

The following are additional observations from the game:

- Funding was always viewed as limiting by the regulators.
- Lobbying for legislative actions was viewed as particularly important by the regulators. However, they very much wanted to control actions in this area. They are acutely aware of the political arena and the impact of politicians on their work.
- There were disagreements between the subgroups that evolved over who had the real power. For example, the Locals wanted the ability to set more stringent requirements than the State or Feds.
- In a one-stop-shopping scenario, each subgroup would have to give up some power. However, one-stop shopping did not occur.
- The group dynamics were positive but normal human miscommunication occurred in the play of the game.
- Relative to the game format, the absence of an intermediary architect/engineering or consulting groups was viewed by some regulators as being atypical of reality. These organizations were viewed as being "more conservative" than the present players.
- There was considerable support for one-stop shopping and technology certification. However, there was limited progress in making these happen in the game.

PURPLE TEAM - CUSTOMERS

Chronology and Highlights

8:00 a.m.

City of San Manuel

Purple team has elected Mary Tucker as Mayor of Grimesville. Meeting with general public, chamber, business folks. Chamber (G-public) may want a recall vote. Mary is expressing concern about her loss of young people from the community and the 15% unemployment rate. She is working with her constituents to learn their concerns and garner support for her economic development plan. Snarly businesses remind Mary that she won only by the slightest margin of the labor force. She's not sure why they're so snarly. She thinks maybe they haven't read their book.

GM Auto

Industry (Bob [GM] & Greg [US Car]) have approached the ailing Babco to see how they can work together to move along the concept of the zero-emission vehicle. Babco has suffered heavily from lay-offs. They have considered a corporate raid rather than dissolution of the company. Bob told Babco they are thinking of going to the US battery consortium since Babco hasn't responded to his offer to buy batteries, or to consider taking an equity position if that would help with regulators. Stimulated them to worry about their R&D. They've been working with the labs to make sure their technology is sound. GM has told the env. that if they can't give Babco some leeway and work with them on the risk analysis, GM will have to get batteries offshore. The Envs said they understood the concern and would look into it. Just an informational exchange. 10:30 Babco is trying to win Bob's heart back. They are late for the meeting and he was ready to go to Japan for the technology. Al Myers says GM should buy American. Babco has been working with the labs. Signing a contract for development. Babco needs to talk with GM about taking GM with them to the banks. GM is willing to do the business plan, MOU. Will buy x number of units of old technology, x number of units of the new technology a year from now. Willing to buy enough to meet GM's 2% requirement. For '98 to 2003, willing to sign up for 2% of needs on existing technology. 1,800/year of old technology. @ \$3000/unit for old technology and \$2000/unit for new technology.

Consortium of Military Base, San Manuel & DOE

Gene (military bases), Fran (mayor of San Manuel), and Bruce (DOE Waste Sites) are working together to make sure the technologies they need for clean-up and landfills aren't squelched by the regulators. Trying to sell a total package of base clean up, economic stability and environmental quality of life. Clean up the site and provide long-term use of the property. Fran is also facing a recall. Military base has made a proposal to CUTS to come on to the base. CUTS wants a complete waiver on the licensing fees. Issues for CUTS include non-disclosure. CUTS wants to keep rights to profits if the technology is used on other bases. CUTS agrees to the conditions for hiring minorities, women-owned businesses, etc.

Greg thinks he and Bob may not be able to keep up teaming as both Urban Sprawl and GM. There is just too much to do.

Urban Sprawl

Greg met with Behemoth. How clean does it have to be? How quickly? How much is Urban Sprawl willing to pay? Various levels of contamination. Urban Sprawl is willing to consider developing in stages, provided that is acceptable to the community. Community backing is seen as essential. Also another site adjacent to Urban Sprawl with pollution levels unknown.

Behemoth is going to use their proprietary computer modeling technology to characterize the adjacent site for Urban Sprawl to be able to develop, as well. Urban Sprawl is encouraging Behemoth to be more proactive with the community, government and environmentalists. Good strategic alliance between Urban Sprawl and Behemoth. Incentive to clean the Behemoth site is reduced because there are other sites on the map which may be more attractive to Urban Sprawl.

Choc o Chip

Bob (Choc o Chip semiconductor) has approached Electra to see if they could help clean up the soil on Choc o's property.

Gene, Fran & Bruce

Gene and Fran have gotten the regulators to agree to build variance and demonstrations into the state permits. Agreements from both CUTS and Restore in place. Two agreements in place which allow letters of credit for both CUTS and Restore. Have financing, permits, exemptions built into the regulations for demonstration purposes. These are both demonstration projects. Advisory group has been formed to include env., gen pub, mayor and DoD. CUTS is being considered for financing through CA Pollution Financing Authority, which would provide a conduit for favorable rate financing capitol project needs. Meeting with Environmentalists. Consortium has met with the Chamber Red. Assoc., and currently meeting with Env. Bruce has asked CUTS to identify their suppliers so they can begin discussion with them for locating those suppliers on the base to develop busin. park. Meeting with suppliers at 10:35 along with CUTS on an agreement to support CUTS and to attract other businesses into the site.

General Notes

The Purple Team is very proactive, going after contracts and alliances and forming consortiums within the team in the first half-hour of play. They require very little direction from the staff, except details on logistics of the game. They are enjoying the role playing. Gene Herson is extremely directed and energetic. Fran David is administratively efficient.

Bob Pfahl has made the point that looking at the government (city, etc.) agencies represented at the games, 50% or more seem to be women. His reflection is that industry is obviously not providing opportunities for women. Greg's feeling is that even in industry, women are highly involved in the environmental aspect of business.

1:00 pm

Urban Sprawl

Working with Behemoth to try to assess both original and adjacent southern lots. The lot to the north of Behemoth is owned by Urban Sprawl. It was used for sheet metal work until the early 80s. Expected to have heavy metal and solvent contamination; specifics unknown. At present

Urban Sprawl is considering a development plan to cover both Behemoth sites to accommodate the citizens' requests for bike paths and parks and the federal requirement for low-income housing. Needs to work with the City on zoning and potential to deed back park land for operations and maintenance by the City. Get in, develop and get out. Contingent on Behemoth being able to clean up both sites. Approached the regulators early on to talk about how clean is clean. They said to come back later.

2:30

Sting operation on local regulators is successful. Two local regulators, Paul Giardina and Gary Nolan, have accepted bribes of \$1 million each from Urban Sprawl to permit as clean a polluted piece of land owned by Urban Sprawl. The defense's case is that the two defendants were operating a counter sting with the Grimesville police department on Urban Sprawl. The defense, however, could produce no corroborating witnesses. The case was decided on a Karma Kard, which gave the regulator team a judgment in their favor. The Grand Jury indicated that they would have found for the government's case.

3:50

Mayor Tucker, Mayor of Grimesville, came to the analyst to find out the facts of the Sting case. Urban Sprawl had offered her money to support some city-sponsored educational programs, and she wanted to know if Urban Sprawl is an up-and-up company or if they really offered money to the regulators.

Friday 8:00

City of Grimesville

Mayor Tucker died; we will elect a new mayor from the public group. Urban Sprawl will contribute to a specific person's campaign because she supports Urban Sprawl's objectives. Mary indicated in her will that she would like a park named after her.

The new mayor of Grimesville is Dorothy Fisher Atwood, formerly with Restore in San Manuel County. Mayor Atwood, who has a technical background, is meeting with Urban Sprawl to get the low-down on the contaminated site in her new city, Grimesville.

San Manuel

Meanwhile down in San Manuel, I hear noises at the other end of the table that "the suppliers have finally gotten hungry," whatever that indicates.

Urban Sprawl

With the death of Mayor Tucker, Urban Sprawl has lost its close relationship with the City. Also, unscrupulous public officials have retaliated against Greg for his participation in an FBI sting against said officials, holding up the permits of all businesses, including CUTS, who are associated with Urban Sprawl. Greg is holding a public hearing to convince the new mayor and ease the new doubts of his old friends in the community. He is presenting his new image and new, more environmentally sound philosophy of urban development.

Nolan has interjected himself into the public meeting with his “evidence” which he claims he had to obtain through the Freedom of Information Act because of lack of coordination between government agencies. The council meeting ended in a shouting match with the police arriving to eject the two shoutees.

Choc o Chip

Bob has contracted with Electra to buy a unit to use as a pollution-prevention technology on his process.

Post-Game Debriefing: Presenter - Bruce Kern

⇒ Strategy

- Teaming [City of San Manuel/DoD/DOE]
- Sustainability vs. abatement
- Early engagement and consensus building
- Long term integrations - 2nd day

⇒ Format

- Value of second day
- Friday/Saturday
- Speakers
- Limited regulatory requirements
- Shift regulatory pressure to customers

⇒ Personal Experiences

- Not a lot of risk taking
- Build in more opportunities for feedback (meals!)
- Continuous feedback communication mechanism
- Networking invaluable
- Application of new paradigms

Analyst's Report

The municipal governments of San Manuel and Grimesville were incredibly successful early in play, attributable I think to the backgrounds in city government that both players brought to the game. They seemed quite nonplused by the level of chaos early in the game, as if it were a normal state of affairs for them. In contrast, the industry players were much more susceptible to the state of flux and expressed dismay at feeling unable to operate effectively in the early round of play.

The other observation I have for the relative successes of the players is that the industry reps weren't welcome in discussions at the Regulator tables or the Environmentalist tables. They were viewed as Farengi Traders, intent on pursuit of the dollar at all costs. The mayors, however, were welcomed at all tables. For example, to help the Blue teams surmount the requirements

raining down upon them, or to form a coalition for moderation and unification of permitting requirements.

The involvement of Urban Sprawl in a sting operation relatively early in play was unfortunate from many perspectives, not the least of which was the image of profit-makers that it portrayed. Urban Sprawl could never recover throughout the rest of play, and every initiative in which it was involved was stonewalled.

Strategies:

The mayors of San Manuel and Grimesville were quick to establish coalitions and work toward common goals. They created deals which were linked in a common strategy and demonstrated a *Crescit Eundo* approach to the game. The industry players on the Purple Team never got past the *Carpe Diem* level of strategy. They met with much opposition to their early attempts to pull technology from the Blue teams, and they learned by day two that they were much more successful when they had a mission beyond merely making maximum dollars.

RED-F: FINANCIAL

Chronology and Highlights

Team Objectives

The Finance Team began by forming a strategic plan. It put itself in the role of a combined venture capitalist and commercial banker called Shark. (The term Shark came from an assessment by a Blue Team.) It analyzed the various investment opportunities of the Blue Teams from the Game Scenario with a view to which investments would be desirable. During the first day of play, the team went about their interactions with the other teams much as a combination commercial banker/venture capitalist firm might. During the second day of play, the team objectives changed to resemble that of an entrepreneurial firm (with strong venture capital slant) that was interested in realizing very large returns on their capital.

Team Characteristics

The team consisted of 4 members with backgrounds in business, venture capital, commercial banking. The team members interacted well with each other, and there was a genuine spirit of camaraderie.

Team discussions/deliberations/conclusions

During the first day, the Finance team did not see any really major opportunities. When the various companies came to Finance, none of the opening offers from the companies were particularly exciting or energizing. The companies were not particularly interested in Finance's counter-offers (e.g. fractions of equity ownership for a given amount of capital investment). The first day, Finance acted like a classical mixture of a venture capitalist and a commercial banker. Acting out their roles, Finance would not invest unless the investments seemed like things they might make in the real world. This resulted in only lukewarm interest from the other Blue Teams; by the afternoon of the first day, the level of excitement for Finance was not particularly high. This problem was exacerbated by the relative abundance of investment funds by the Blue Teams, and the seeming lack of urgency on the part of the other Blue Teams in getting financing. However, Ted Briggs did plant a false rumor that someone on the ROCAR Team was trying to cut their own deal with Shark. Ted clapped the shoulder of the "culprit" on the Clohi team. The subterfuge was never discovered.

On the morning of the second day, the facilitator suggested that the team should adopt a more entrepreneurial stance, a suggestion that was immediately accepted. One member (Ted Briggs) came up with the idea of going to Jefferson Labs and getting a patent position on a new technology which offered complete, clean combustion (with virtually zero NO_x) to only CO₂ and water. The idea was that Finance would convince the state and federal EPA's (and California) that a unit should be installed on all new trucks, with retrofits to existing trucks, in order to meet a new California requirement for zero emissions (as the result of backdoor lobbying by Finance). Then, Finance would go to Gary Motors and offer their use of our patent position for the sum of \$500 per unit.

The negotiations, interestingly, went pretty much according to this game plan. We initially interested Jefferson Lab in the new technology under development in their laboratory. The patent rights amounted to only \$10M. Ted then called a joint meeting of the legislative and environmental teams to argue that because of the new technology for nearly zero emissions, that zero emission legislation and regulatory standards should be passed; this would require that all trucks have the new emission reduction units that Gary Motors would manufacture. After obtaining the required political and regulatory agreements, Finance then went to Gary Motors with a buyout offer. Gary demurred on this, but agreed to a deal where they would manufacture the units (retrofit for 4,000,000 existing trucks and annual sales of several hundred thousand units with a royalty to Finance of \$500 per unit). Total profits to Finance thus exceeded \$2 billion. As a result of the deal making, the level of energy and interest on the second day for Finance greatly exceeded that of the first.

Post-Game Debriefing: Presenters - Tom Anyos & Ted Briggs

• Big Oil ↓ GREEN	\$5M Equity	\$1.66M shares @ \$3
• Restore	\$12M Line of credit	1% fee + 1 over prime interest
• Electra	\$5M Line of credit	1% fee + 2 over prime
• VARIOUS FEES EARNED	Broker fee Consultant fee Babco underwriting	\$2M

Shark License
Transactions
No-NOX Diesel

Paid Out

\$10,000,000 to Jefferson Labs
100,000 Legislative campaign
50,000 Consultant fee

\$10,150,000

Paid In

\$ 1,000,000 From GMC
2,000,000 Royalty - New diesels
2,000,000,000 Royalty - Retrofits*

\$2,003,000,000

*\$500 per unit X 4,000,000 diesel trucks in California

“Your Extremity is our Opportunity”

Analyst's Report

I feel that the role of the facilitator was critical in stimulating Finance into a more entrepreneurial stance on the second full day of play. Although the facilitator acted as a catalyst, Ted Briggs and the rest of the team took the initiative. One of the interesting things is that as with the September Electronics Games, Finance actually created money by positing a new technology (within the ground rules of the game) and got the various agreements necessary to make their idea a “reality.” A major “lesson learned” from the game is the critical importance of some creative deal making and the energizing effect of leveraging a technological breakthrough.

It is interesting that on the second day, Finance had more things on its plate than it could handle, and the members were stretched pretty thin trying to respond to various offers from the other teams (though the rest of the deals were of a much lesser dollar magnitude than the above “core” deal involving Gary Motors). Part of this increase in overall activity was triggered by a news announcement that reduced available funds to the 4 Blue Teams. For example, ROCAR said that it was going to Finance only because it had to compensate for being docked by \$5 million (as the result of new information in a news broadcast). Still, I think that part of the dynamics was that of the “second day” -- also observed in the September games -- where socialization, familiarity of the possibilities of the game, and the competitive instinct all combined to increase the tempo during the second day. I suspect this kind of a phenomenon with games and interactive activities in general where the participants come in not knowing each other all that well, and where part of the interaction depends on the team dynamics.

I thought it was interesting that Finance’s big entrepreneurial triumph received virtually no recognition in the other teams. This was due in part to the fact that team members divided up to do separate tasks, and that Finance closed the deal relatively late in the game. I think that in this respect (as in a number of others) the game mirrored the “real world” quite well, e.g. where the right hand does not know what the left hand is doing, and where there is (as in the games) no master plan. The outcome of the games was the result of the quasi-independent actions of a large number of members.

The games modeled reality quite well in the different character of the various teams. ROCAR was dominated by one player. At the last minute, a deal with ROCAR fell through because of a chain reaction of events involving another team.

I think the games were successful and mirrored the kind of reactions that occur in real life. The length of the game was reasonably optimal and allowed the team dynamics to gel.

It is helpful for the facilitator to go over some of the many generic possibilities for team action to stimulate creative thinking (e.g. new technology developments, influencing regulatory policy, etc.) as long as the “possibilities” are not too closely tied to the specific game scenario.

I think the use of Business Teams (Finance, Blue Teams) provides an indispensable contact with “reality” and facilitates the writing of specific scenarios for a wide variety of potential Prosperity Games. Although the Environmental Games had a complex set of teams, business provided the essential context for the regulatory and legislative activities.

In retrospect, the Blue Teams (not Finance) had too much money at the outset. It is clear that it is best to start with very tight budgets, and monitor the game well enough to add money as necessary through the use of the newscasts. I think the newscasts are a very effective means of changing the parameters of the game in a way that seems “real” within the context of the game.

It would be interesting and helpful to adjust the normal distribution to make it more costly (in a relative sense with respect to the cost for the 50% level of success) to attain high probability levels of, say, 97%. This would make it relatively easy to have a 50-50 chance at something successfully happening, but hard to guarantee that something happens. The teams would really have to think twice about their priorities, which I did not perceive happening during the previous Games. Another interesting rule is that if something does not materialize, it can be tried on a subsequent game move, but it costs substantially more to achieve the 50% probability level.

In the most busy part of the Game, Finance had only two available people. This stretched things too thin. An optimal team size would have been something like 4 people, but no more than that, to help preclude the outcome of insufficient work for the team members.

In all scenarios, every Blue Team should have a capital shortage that requires the successful surmounting of one or more hurdles (if only to make a case for outside financing).

RED-J/L: JUDICIAL/LEGAL

Chronology and Highlights

Team Objectives

- To have a rich (both qualitatively and financially), varied experience.
- To provide quality services and to decide cases fairly.
- To educate about the benefits of mediation.

Team Characteristics

The team tends to discuss and solve problems collaboratively, probably due in part to the fact that some of the team members are mediators. The team members are congenial and seem to agree with one another for the most part. There is not a lot of friction or inflexibility, with a few exceptions. Jennifer is very independent. In contrast to the dispute resolution orientation of the rest of the group, Jennifer is focused on being an advocate for her clients. She has strong opinions which sometimes differ from the rest of the group, and she's not afraid to voice them. John Lee also displayed strong partiality for his clients when he was a lawyer on trial.

Except for Jennifer, the team has a bias in favor of mediation for dispute resolution. The team appears to function as a single, diversified, all-service company. They deliberate issues and reach decisions in a collaborative manner, and they pool their earnings. People work as a team. The only exception is Jennifer who is working independently.

Discussions, Deliberations, Conclusions

At the beginning of the game the group discussed procedural issues, including:

- How will they decide who serves in what role? Should they develop a schedule that designates who serves what role when? Set up panels? Deal with it on a case-by-case basis?
 - Will there be enough work to keep them busy? Should they advertise, use the media? How should they attract business?
 - Due to the limited number of players and the need for both judges and lawyers simultaneously, how many judges should serve at a time? What's the minimum number?
- These and other procedural issues were discussed and decided upon collaboratively among the group members who were present.

In Jennifer's absence, the team discussed modifying the rules to promote mediation as the first step in dispute resolution. There was general consensus that this was a good idea. My impression is that this issue was more strongly championed by the professional mediators than the rest of the group which agreed in concept but did not have as strong of an opinion. When Jennifer returned, she challenged the rule as wasteful in some cases, stating she needed something binding for some of her clients (such as the state). Because Jennifer held a firm stance in opposition to the rest of the group, she was initially challenged. However, she presented valid reasons in a non-adversarial though firm tone. After some deliberation, the rules were modified to require mediation except for special circumstances when a binding decision was necessary. This was the most tense situation that occurred among group members.

Case #1: FBI (plaintiff, Greg Pitts) vs. Local Regulators (defendant, Paul Giardina and Gary Nolan). This case was known as “The Double-Sting Operation”. Defendants were accused of accepting a bribe to allow development on contaminated land. The case went through litigation. Rob assumed the role of lead judge; other judges were Susan and Jennifer. John was the plaintiff’s attorney while Walt was the defendant’s lawyer. Rob assumed a leadership stance. He defined the time parameters, controlled (but did not dominate) the proceedings. Each team presented their points, with recesses as necessary. Initial deliberations among the three judges resulted in two voting for conviction (Susan and Jennifer) and one unsure (Rob). The case was extended to allow more time for rebuttals, discussions. Despite a persuasive effort by Walt, the judges voted unanimously for conviction. However, a Karma Kard reversed one of their opinions, resulting in a hung jury. Rob tactfully critiqued Walt afterwards.

Case #2: IRS (plaintiff) vs. Behemoth (defendant). IRS sued Behemoth for failure to pay \$5 million in taxes. Walt was Behemoth’s attorney, John Lee was the IRS lawyer. John played, had fun with it, got devious, froze Behemoth’s assets. This case was directed to mediation. Rob was the mediator. John believes that because the defendants have large assets and multinational status, they must have at least 1,000 employees and are therefore subject to the tax. Walt’s claim is that the plaintiff has no evidence and that his client downsized and subcontracted out work. Rob did a good job as mediator. He was impartial and sensitive to time, listened to both sides, and caucused separately with each side in confidence. He summarized the defendant’s points and evidence. He had control and didn’t favor anyone. John was very firm in his stance, however, so the mediation was unsuccessful. Then the tax law was repealed so refunds were issued and the case was moot.

Case #3: Public (plaintiff) vs. Big Oil (defendant). Minority class-action suit, anti-trust. Big Oil merged with Clohi, forming a monopoly. Allegedly the motive was to suppress new technology. Volker, Walt, and Rob were the judges, John was the defendant’s lawyer, and Susan was the plaintiff’s attorney. The case was referred to mediation. Walt was the mediator while Rob played the lead judge. Walt explained the mediation process and why it’s preferable to a trial. The mediation process went well, progress was made, and each side remained somewhat flexible. Each side continually made counteroffers which eased up slightly on their stance; they inched towards a mutually agreeable compromise. Walt remained neutral. Some of his strategies included: reminding each side of the good points of the other team’s counteroffers, paraphrasing, encouraging each side to ease up by considering the downside if they lose the trial and the upside if they settle, and calling private caucuses to diffuse emotions. Walt is effective at reading between the lines and understanding the bottom line of each side’s desires. He understands each side enough so that in the private caucuses he can interject the other team’s point of view in a dispassionate way, which avoids face-to-face emotionally charged confrontations. He considers underlying rationales and diffuses emotions. The mediation was successful; the case was settled.

Quotes

- “Ultimately we want to get people thinking in terms of mediation.”
- “That’s the irony: if we really do our job, we won’t have any business.”
- “Wouldn’t that be something if our team ended up making the most money?”

“That would be close to reality.”

- “It’s the only way I can win.” “It’s a make or break issue for one of my clients,” on the need for the option of binding arbitration or litigation instead of mediation.
- “We’re the law gods. We can make any rule we want.”
- “You came to the right place. We love underdog causes.”
- “This is terrible. Mediators starting up conflicts. This is unethical.”
- “I doubt this has happened in prior Prosperity Games, a criminal trial.”
- “Everyone is wheeling and dealing.” -- Volker
- “Now I know why lawyers have a bad name.”
- “I think in real life there’s a lot more litigation than in the Games.”
- Mediator phrases:
 “What I hear you saying is...”
 “I would urge you to realistically look at this case, otherwise it’s going to trial.”
 “I’m just trying to get you to think about different options here and not get stuck on one path.”
 “We can’t think of the past in this case. We have to think about the future.”
 “I know they’re not going to accept your offer because...”

Income Statement for Red - Judicial/Legal Team

Session	Description of Transaction	Income	Expense	Balance
?	Provide draft of content for Advisory Panel: DoD, Restore, City of San Manuel	\$ 5,000		\$ 5,000
?	Agreement. Restore agrees to hire all union truckers for landfill	5,000		10,000
2	Volker wrote agreement to represent Green team on recall of Grimesville mayor	10,000		20,000
3	Green Public team received labor services from Susan Brechbill	5,000		25,000
?	Walt Hays wrote agreement with Blue 4-Behemoth to represent them before regltr	30,000		55,000
4	Court holding on to \$1M from FBI vs. Giardina case; it's the federal governments	1,000,000		1,055,000
5	Lawsuit/trial. IRS vs. Behemoth. Failure to pay tax	2,000,000		3,055,000
5	Tax law repealed. Refund \$2 million		(\$2,000,000)	1,055,000
5	Susan Brechbill work for Urban Sprawl	100,000		1,155,000
5	Walt Hays' fees for defending Behemoth in trial	100,000		1,255,000
5	Electra paid Walt Hays for lobbying Air Resources Board	10,000		1,265,000
5	Paid to John Lee by Big Oil for legal counsel	100,000		1,365,000
5	Paid to Volker by Green Team	20,000		1,385,000
6	Paid to John Lee by Big Oil for representation in trial	200,000		1,585,000
6	Paid to Taz by Green Oil for trial	1,000,000		2,585,000
6	Paid to Taz by Green Environmental Team for trial	100,000		2,685,000
6	Susan Brechbill service for Yellow team: extradition documents	100,000		2,785,000
6	Walt Hays services to Red - Legal team	100,000		2,885,000
6	Volker work for Green - Environmentalist team	25,000		2,910,000

Post-Game Debriefing: Presenters - Jennifer Hernandez & Bob Barrett

Key Issues, Questions, Goals

- To have rich (\$) varied experience
- To provide quality services and to decide cases fairly
- To educate about benefits of mediation
- Very quiet for 1st morning (some went in search of business)
- Had 3 cases
 - criminal; conviction upset, hung jury, Karma Kard
 - tax case; govt. lost
 - antitrust case; successfully mediated

But no mediations directly

Interface with Others

- Re\$pon\$ive
 - Proactive
 - Different teams used J/L team differently
 - some used extensively
 - some very little, “big picture” teams
-

What Learned

- Easy to make money in legal business
 - Stir the pot - one lawyer will starve, two or more can get rich
 - Lawyers played very useful roles as advisors; also useful as advocates in disputes
 - Bias in favor of litigation; not much understanding of alternatives
 - Karma Kards caused cynicism about dignity of the judiciary
-

Other Comments

- Judicial rules - amended to permit case management coup; helped to keep flexibility; sent case to mediation
- Roles: neutrality vs. advocacy
- Fees
 - too high for litigation
 - not tied to time case; was pending
 - fee waivers for public entities

- Confusion about processes, mediation, arbitration, declaratory judgment. Need clear explanation or written matter
 - Too much money in game
 - Eliminate time limits
-

Analyst's Report

STRATEGIES:

Unlike the Blue Teams, the role of the Red - J/L team within the Games didn't lend itself to much strategizing. However, they did develop the following strategies in support of their team objectives:

Soliciting work:

- At the beginning of the games when the team had no money, they struck a deal with the media. The team proposed to give the media 10% of their first mediation revenues in exchange for an ad in the paper.
- The team distributed literature on tables as PR. (The literature was an application form for dispute resolution).
- Some team members performed pro-bono work in hopes of attracting paid follow-on jobs.

Advocating mediation:

- The team drafted a Policy Paper on Improving the Environmental Litigation Process, *requiring* mediation as the first step in dispute resolution.
- The team restructured the pricing and time allocation of the various dispute resolution options listed in the Players Handbook. More time was allocated for mediation, and the price was reduced.

Ensuring variety:

- The team decided to take turns and rotate roles: mediator, judge, lawyer, advocate, contract-writer. Clients would be assigned to someone, instead of having a choice.

Deciding cases fairly:

- Team members who performed advocacy for a particular client would not serve as judges or mediators in their cases.

LESSONS LEARNED ON DISPUTE RESOLUTION:

- Even the most skilled mediator cannot foster an agreement in the face of very inflexible parties. Some degree of flexibility is required for disputing parties to forge a settlement.
- Parties should expect to sacrifice something in a settlement. They usually will not get everything they want.
- Caucusing with each party separately can be an effective means to reduce emotional intensity and promote rational, calm thinking.
- Mediation can be a very good tool for environmental dispute resolution. 90% of mediation cases result in settlement. Mediation and collaboration should be strongly promoted to resolve environmental and other disputes. (Bravo to Joint Venture's and the Environmental Partnership's collaborative approach!)

- In the real world, litigation seems to be the traditional, default dispute-resolution mechanism. There seems to be little understanding of alternatives. No one in the Games came to our table and requested mediation. They generally requested litigation and were redirected to mediation.

OTHER OBSERVATIONS:

- The use of the J/L team varied among different teams. Some teams used our services extensively, while others used us sparingly, focusing instead on “big picture” issues and solving their own disputes.
- The team had conflicting roles: neutrality versus advocacy.
- The team instituted fee waivers for public or non-profit entities.
- Because the team was hungry for work and action, they became very happy and excited when a conflict arose which required their dispute-resolution services.
- Jennifer’s knowledge of environmental regulatory structure and laws was very useful to many groups, including the legislative team.
- I believe the team achieved their objectives.
- The mediators were very skilled in dispute resolution. They added a lot of value.
- In terms of the Red - J/L team’s role in the overall context of the Game, I believe they succeeded in providing a realistic context for the Blue Teams. The only exception is that our team favored mediation, which is not the case in the real world (though it should be!). I am not, however, an expert on our judicial system so this is a lay person’s perspective.
- A member of the Red - Legislative team told me that everyone assumed a legislator could be bought. A bit of insight on the real world.

Areas for Improvement

- In the first half of the game the legal/judicial team had little work. Perhaps the price for litigation (\$1 million) could be reduced and mediation could be promoted.
- Court fees not tied to time case was pending. Eliminate the time limits.
- Our team members believe that Karma Kards induced cynicism about the dignity of the judiciary (i.e., illicit affairs, last-minute decision reversals resulting in acquittal).
- There was confusion about the various dispute resolution processes: mediation, arbitration, declaratory judgment. Need clear explanation of written material.
- Too much money in the game.
- Be careful throughout the Games to avoid stereotyping and favoritism to any political party, such as Republicans. The \$5 million Democrat-induced tax law was not favorably received by all players.
- A team should not be able to pay for 100% probability that a technology will work. This does not represent real life. If the science is flawed, no amount of money will change it.
- Some players should switch roles (for example, a businessperson plays an environmentalist) to learn the perspective of the other side.
- Sandia should conduct a long-term evaluation, say in nine months, to assess if the Games had any long-term impact. Did the Games result in any tangible outcomes?
- The food was wonderful!

RED-L: LEGISLATIVE

Chronology and Highlights

Wednesday, March 29

5:30 - 8:00 p.m.

Wednesday evening we had two people, Glen Gilbert and David Buckmaster. Both were well informed and had read the book thoroughly. They were very impressed with the work and detail that was put into the project. Seemed anxious to participate. Gib Marguth showed up a little later.

Thursday, March 30

Player Attendees:

- David Buckmaster is a staffer in Assemblyman Jim Cunneen's Office. From business background.
- Dara Menashi is a Ph.D. student in environmental studies at Harvard. She is working temporarily at Joint Ventures.
- Glen Gilbert is a Senior Consultant in Assemblywoman Barbara Lee's Office.
- Gib Marguth is in Technology Transfer at Sandia/Albuquerque on loan for six months. Has considerable political background, i.e. former Mayor of Livermore, served on State Assembly; owned an electronics company.
- Kim Welsh is with Joint Ventures

A total of five people showed up out of the eight invited. All of them read the book, however, Dara Menashi and Kim Welsh were not quite sure what they were supposed to do. Deborah (Facilitator/Analyst) asked what kind of body they wanted to represent--Federal or State. Most said State. They elected a Committee Chairman -- Gib Marguth.

Each decided on a role they would play:

Glenn Gilbert	Assemblyman, Grimesville (Role: Flexible on environmental issues, pro-economic development, reputation as "thinking-person's-bomb-thrower.")
Kim Welsh	Assemblywoman, Country Club Estates. (Role: NIMBY, elitist, big bucks.)
Dara Menashi	Assemblywoman, San Manuel (Role: Legislative spokesperson for no-growth/environmentalists.)
David Buckmaster	Assemblyman, City of Industry and Commerce. (Role: Pro-business, capitalism, but responsible.)
Gib Marguth	Assemblyman, nowhere in particular. (Role: Chairman, Moderator)

8:30 a.m.

Kim and Dara asked if we needed to get involved, to interact, i.e., go out and seek business. Gib said people most generally will not come to us, since they have to pay and no one wants to pay, but we do not have to go after business. Everyone felt it would be slow if they waited for people to come to them. Deborah suggested there might be more action later in the day as a result of transactions between the other teams.

A discussion pursued some of the issues that might be brought up. Glen wanted to know how to determine when clean is clean, will technology work, how well it can be controlled. Kim asked who decides environmental impact. Gib said you can prepare you own impact representation, but

should use consultant. Dara asked how this gets decided--go through agencies. She also asked how something will get certified--what are the certification requirements. Mary Tucker, "Mayor of Grimesville" came to visit. She is setting up advisory committees to improve life for the people in her city without loss to environment--wants to use clean technologies. Gib indicated we can pass a law on standards--Glen said we can cut through regulations for a fee. Mary replied that her city will have *some* money to deal with. She wants to make sure they are scientifically-based regulations. Kim wanted to know if one regulation is approved, will this apply to all regulations. Gib said we may want to have a consultant. Mary asked if we were setting up a media release. If so, she wants our assemblyman from her district to participate in a group discussion.

Mary left and the group left to go visit people. Kim went to visit Restore, Inc. They were responsive. Want to meet with her later. Dara visited a few groups--not too much comment.. David offered services.

9:30 a.m.

Gib suggested that in order to get things rolling they should hold hearings to consider legislation. He asked them for objectives of the hearings they were going to introduce. Discussions among the group to identify the issues to consider a legislative bill on environmental technologies.

10:20 a.m.

Yellow Team representative visited. Conversation ensued about charges, technical services, honest brokers. The group indicated they would probably need to use their services and would contact them.

10:30 a.m.

Discussions continue on the hearings:

- In considering new technologies, which Board or Agency should have the final determination to certify that a product or process meets the required standards?
- In order to protect our environment while encouraging economic development and progress, should the state have a process for overruling local regulatory decisions?
- As an alternative, should the State create a single, multimedia (water, air, soil, etc.) permitting system?
- If a state-wide permitting system is established what appeal process will be required for the respective regions?
- In setting standards for the State, what type of technology and science review process should be established?

The issues were finalized into a Press Release which was given to Marshall to announce.

PRESS RELEASE

ASSEMBLY COMMITTEE ANNOUNCES HEARINGS ON ENVIRONMENTAL TECHNOLOGIES

The California State Assembly Committee on Natural Resources and the Environment will be holding hearings to consider legislation affecting the following areas:

1. In considering new technologies, which Board or agency should have the final determination to certify that a product or process meets the required standards?
2. In order to protect our environment while encouraging economic development and progress, should the state have a process for overruling local regulatory decisions?
3. As an alternative, should the State create a single, multi-media (water, air, soil, etc.) permitting system?
4. If a state-wide permitting system is established what appeal process will be required for the respective regions?
5. In setting standards for the State, what type of technology and science review process should be established?

Hearings to consider these legislative proposals will begin at 10:55 in the rear of the conference room. Comments and suggestions will be considered until 12:00 noon. At that time, legislation will be passed to go into effect on July 1, 1996.

SESSION 2 - January 1, 1996

10:10 a.m.

Deborah distributed the \$1 million tax revenues for 1995.

10:45 a.m.

New Bill (HR-1995-1) is presented by Green Team Regulators. Lynn Edgerton met with Glen and Dara concerning the bill. USEPA George Robin (Green R) is meeting with Dara.

10:50 a.m.

Marshall reads Press Release of the Legislature announcing hearings on proposals on environmental technologies. Hearings to consider these proposals will begin at 10:55.

10:55 a.m.

Appointments for hearings were set up. (Had a line of people waiting to sign up) Scheduled appointments ten minutes apart until noon. Dennis Berry (Yellow Team), Gene Herson (DoD), Bruce Kern (DOE), Bob Crandall (Green E), Debra Nissen (Green Public), Fran David (City of San Manuel). City of Grimesville left written testimony.

12:40 p.m.

Marshall announces Press Release of Proposed United States House of Representatives Bill HR-1995-1. Hearings to begin at 12:45.

PRESS RELEASE

PROPOSED UNITED STATES HOUSE OF REPRESENTATIVES
Bill No. HR-1995-1

The United States Environmental Protection Agency (USEPA) is hereby directed to establish a National Technology Certification Program (NTCP) for all media (namely, air, water, soil, sediment, solid waste.) This bill gives USEPA such authority and funding in the amount of \$1 million per year for 5 years to establish such program. In establishing the NTCP, USEPA will submit draft regulations for implementation within 90 days. This regulation will include a pilot

project developed in conjunction with California EPA to recognize the State of California's Technology Certification Program (CTCP).

A public hearing will be held beginning at 12:45 p.m. at the rear of the Conference Room.

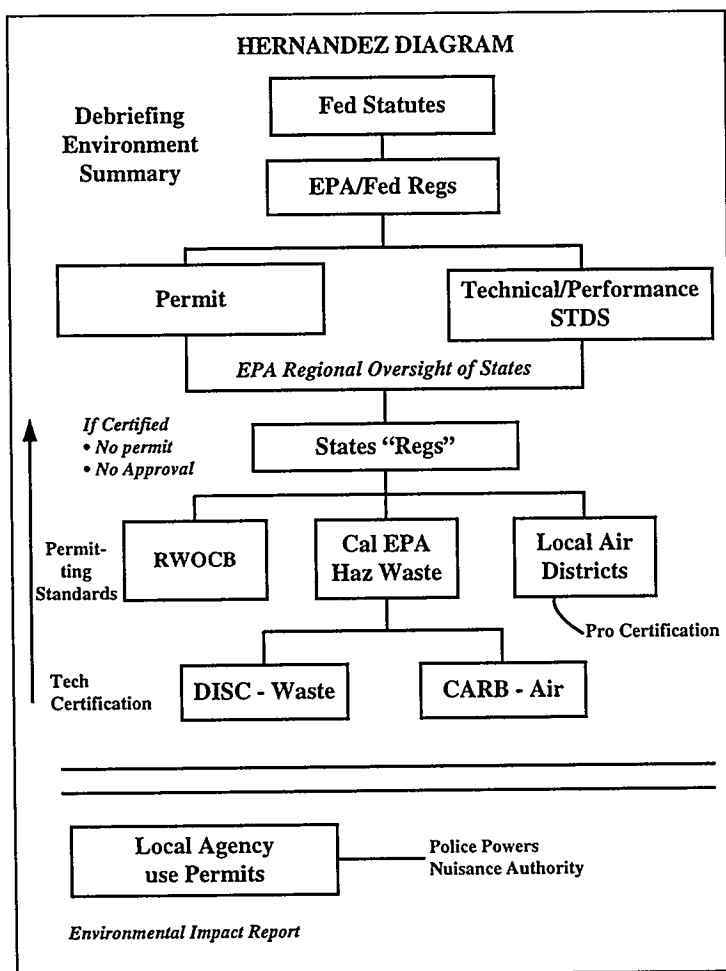
Comments and suggestions will be considered until 1:15 p.m.

SESSION 3 - January 1, 1997

1:00 p.m.

Deborah distributed the \$1 million tax revenues for 1996. Started scheduling appointments for testimony on Bill HR-1995-1, along with rescheduling appointments with individuals we were unable to see regarding the environmental technologies proposals.

As issues were discussed several items were raised that the group was having difficulty figuring out what to do. Gib suggested we buy a consultant. Kim went to find a consultant. Decided to ask consulting expert (Hernandez-Judicial) to come and explain practices of improving standards. She used the flip chart and made a large diagram of how things work. (This was referred to many times during the discussions.)



1:30 p.m.

Announcement made to identify representatives for Summit and End of Session Report. Dara Menashi was selected as Summit representative. Glen Gilbert was selected as representative for End of Session Report.

1:40 p.m.

Met with Purple Team for agreement between the Purple Team (Grimesville) and Red L for state matching grant funds to leverage federal monies for the Grimesville sustainable education program, an intergovernmental, public/private effort to retrain workers for newly-generated jobs for Grimesville. (\$400K transferred to Grimesville from Red L. Agreement signed 1:48 p.m.)

1:40 p.m.

Announcement of CA/EPA Workshop.

1:45 p.m.

Announcement of Total Democratic Control

1:45 p.m.

Continued with appointments for testimony on Bill HR-1995-1. Met with Gary Nolan (Green Regulator), Sally Jo Webb (Babco), Vic Weisser (Green Public).

Group broke up because of time. Some listened to testimonies on Bill HR-1995-1. Others met with members of the Purple Team (City) to discuss agreement between the Purple Team (City) and Red L for \$1 million from U. S. Department of Commerce (Red L-Legislative) to provide one-for-one federal matching funds for the Grimesville sustainable education program, a public/private, intergovernmental consortium of local and state government, industry and labor. (\$1M transferred to Grimesville Public/Private Consortium from Red L. Agreement signed 2:03 p.m.).

2:15 p.m.

Gib indicated we need to work on the 1997 Environmental Reorganization Act because it needs to be finalized. Need to decide on certification which would direct CalEPA to establish a unified permitting process affecting industries which are involved in air quality, water quality, hazardous waste and solid waste. This bill would establish local permit processing centers to work city and county permit authorities for permit processing.

PRESS RELEASE

1997 ENVIRONMENTAL REORGANIZATION ACT

1. All local Air Quality Districts shall operate under the authority of the California Air Resources Board.
2. Technology Certification by CalEPA shall be deemed as sufficient to meet the certification level of all permitting authorities in the state of California.
3. CalEPA shall have the sole authority to approve testing laboratories for certification of environmental technologies. Such laboratories shall be qualified initially and be requalified each year by a select committee made up of scientific and technologically competent persons

from research universities and national laboratories. One half appointed by the Governor, one quarter each by the Speaker of the Assembly and the President Pro-Tem of the Senate.

4. The CAL-EPA Technology Certification Program shall issue all environmental technology certifications based on CAL/EPA's evaluation of the technology performance and the process in which it will be used. This evaluation shall be based on an integrated pollution prevention and control methodology.

A. "Integrated pollution prevention and control" shall mean a comprehensive multi-media analysis of the total pollution burden of all of the technology's operations, including effects on water, air, soil, etc. The certification will reflect the total emissions into all media. CAL-EPA shall have the authority to set cross-media standards for the issuance of regulations pursuant to this section.

B. Local, regional, and other state agencies shall limit their approval authority to land use siting and standards which are unique and necessary to protect the health and environment of specific geographic locations, and to accept state multi-media certification in lieu of their current permits if the technology is certified to meet the specific standards imposed by the local, regional, or state authority.

5. Appropriate \$2 million to CalEPA for purposes of managing the integrated state certification program. All other costs of the program shall be collected from the applicants.
6. In consultation with the Certification Task Force of the CA Environmental Technology Partnership, CalEPA shall develop and publish a plan to insure equitable and expeditious consideration of all applications for certification under this section.

The criteria may include but not be limited to:

- High risk/High success (health)
- Immediacy of threat, health, economic
- Expected future land use
- Pervasiveness of problem, e.g. number of sites
- Public interest
- Commercialization

7. CAL/EPA shall implement this program on an urgency basis and shall report to the Legislature in one year from date of enactment.
8. To the extent possible, this work would be performed by the private sector.

SESSION 4 - January 1, 1998

2:45 p.m.

Continued taking appointments and hearing testimony for HR 1995-1. Had to reschedule some appointments so the group could discuss the issues for HR 1995-1 and also discuss issues for the 1997 Environmental Reorganization Act.

3:30 p.m.

Mary Tucker (Mayor of Grimesville) came to testify on HR-1995 with an addendum to the amendment. Vic Weisser (President, G.O.D. Foundation) presented a proposal from the minority and economically-disadvantaged public to modify IRS standards for defining minority- and women-owned businesses.

4:05 p.m.

National Environment Summit Meeting

Friday, March 31, 1995
SESSION 5 - January 1, 1999

8:30 a.m.

Glenn arrived late and immediately brought up the issue if perhaps they should share responsibilities or change roles. He felt responsibilities should be balanced. He is a representative for Grimesville and felt he was getting the brunt of the issues--not that he didn't want to do it--just to be fair in having different people experiencing these roles. Everyone agreed to stay where they were. Gib indicated they needed to work on the agreement for CalEPA to carry out legislation proposed. Discussion evolved on certification and standards at different levels of government.

9:00 a.m.

Agreement submitted between Blue Team 3 (Big Oil) and Red L for repeal of Tax Equity Act proposal. (\$100K transferred to Red L from Blue Team 3 (Big Oil). Signed 9:07 a.m.)

9:15 a.m.

Press Release - Repeal of Tax Equity Act passed. The U. S. congress has passed legislation to repeal the Tax Equity Act and to direct the IRS to implement tax credits for those companies which paid the tax and to suspend all efforts to collect the unpaid tax.

PRESS RELEASE

The U. S. Congress has passed legislation to repeal the Tax Equity Act and to direct the IRS to implement tax credits for those companies which paid the tax and to suspend all efforts to collect the unpaid tax. President Clinton signed the Bill and said he hopes this serves to help end the recession

9:30 a.m.

Agreement submitted between Blue Team I (Babco) and Red L for introduction of HRS to secure funding for Babco in the development of their industries in the US. (\$100K transferred to Red L from Blue Team I (Babco). Signed 9:33 a.m.)

SESSION 6 - January 1, 2000

11:15 a.m.

Agreement submitted between Green Team R (CalEPA) and Red L (Legislature) to fund the establishment of a pilot certification center at San Manuel military facility on a matching funds not to exceed \$2 million and establish a fund to assist small business in the certification of environmental technologies. (\$2M transferred to Green Team R (CalEPA) from Red L. Signed 11:27 a.m.)

11:20 a.m.

Press Release - AB-97-1 The State Legislature appropriates \$3 million to CalEPA to fund the establishment of a pilot certification center at San Manuel military facility on matching funds not to exceed \$2 million and establish a fund to assist small business in the certification of environmental technologies.

11:25 a.m.

Agreement submitted between Red F and Red L to introduce legislation effective year 2010 for all diesel engines in California to have no-NO_x engine supplements. This attachment converts regular diesel fuel via a hydrogenation process so that a "clean-burn" of fuel results. The elimination of NO_x (nitrogen oxides) will eliminate 35% of all air pollution in California. (\$100K transferred to Red L from Red F. Signed 11:32 a.m.)

11:30 a.m.

Press Release - Bill HR-2000-2 - The House of Representatives directs the Executive Branch to abolish the Department of USEPA within two years.

PRESS RELEASE

UNITED STATES HOUSE OF REPRESENTATIVES

Bill No. HR. 2000-2

The House of Representatives directs the Executive Branch to abolish the Department of USEPA within two years. Responsibility for establishing standards and accepting technologies for certification to meet national standards shall be assigned to the Department of Interior. The Department of Interior shall have its operating budget increased by an amount equal to 25% of the current operating budget of the USEPA.

Hearings will begin at 11:30 a.m.

11:30 a.m.

Set up appointments from 11:30 to 1:00 and heard testimony for Bill HR-2000-2 hearings with USEPA; Walt Hayes, CalEPA; Albert Myers, Babco; Debra Nissen, citizen; Bruce Gritton, citizen; Jim Allen/State, Green Team R.

12:30 p.m.

Continued with hearings and worked on passage of remaining bills.

1:15 p.m.

Made decisions on passing of bills:

- Passed 1997 Environment Reorganization Act which establishes a technology certification program for environmental technologies. All Air Quality Districts are placed under the authority of CalEPA.
- Passed 1995 (Federal) National Technology Program which establishes a National Technology Certification Program for environmental technologies. A pilot project with CalEPA is also established.
- Passed 1997-1 Pilot Certification Center which establishes a \$3.0 million fund to assist small businesses in the certification of environmental technologies at the pilot San Manuel Military facility.
- Passed 2000-1 Loan guarantee for High Technology Enterprises which appropriates \$1.0 billion in loan guarantees for loans up to \$50 million.
- Defeated HR-2000-2 which would abolish the EPA and mandate that the U. S. Department of Interior would establish standards for environmental technologies.
- The 1999 Zero Emission Diesel bill was held in the committee. This would require no-NO_x engine supplements by the year 2010 in California.

THE ZERO EMISSION DIESEL BILL

Effective 1/1/2010, all diesel engines in California shall have no-NO_x engine supplements. This attachment converts regular diesel fuel via a hydrogenation process so that a "clean-burn of fuel results. The elimination of NO_x (nitrogen oxides) will eliminate 35% of all air pollution in California.

1:30 p.m.

Helped Glenn prepare for his End of Session presentation. Glenn stated some things on the flip chart and everyone contributed. By this time everyone were pretty sure of how they felt and came up with several issues.

4:30 p.m.

Innovator Polling and Analysis. Dara and Kim had not voted the night before. All seemed interested in the comparison between before and after.

5:00 p.m.

Game Adjourned.

Session	Description of Transaction	Debt	Debit	Credit	Balance
1	Initial Funds				
2	Tax Revenues for 1995			\$1M	\$1M
3	Tax Revenues for 1996			\$1M	\$2M
3	Agreement				
	Grimesville/Red L		\$400K		\$1,600,000
	Agreement				
	Purple Team/Red L		\$1M		\$600K
4	Tax Revenues for 1997			\$1M	\$1,600,000
4					
5	Tax Revenues for 1998			\$1M	\$2,600,000
5	Agreement				
	Big Oil/Red L			\$100K	\$2,700,000
	Agreement				
	Babco/Red L			\$100K	\$2,800,000
6	Tax Revenues for 1999			\$1M	\$3,800,000
6	Agreement				
	CalEPA/Red L		\$2M		\$1,800,000
	Agreement				
	Red F/Red L			\$100K	\$1,900,000
	Totals		\$3,400,000	\$5,300,000	\$1,900,000

Post-Game Debriefing: Presenter - Glenn Gilbert

Key Issues, questions and team goals:

- To be players in the games
- To propose a legislative agenda that would stimulate debate, involvement in process (5 point agenda)
- To provide openness, access
- Tried and largely succeeded to balance macro-level planning with demands of special interests

How did you interface with other teams? Competitively? Cooperatively? Both?

Interface with teams:

- reactive
 - passive
 - cooperative
 - autocratic
 - competitive
 - retaliatory
-

What Did You Learn?

- Early on, learned about regulatory barriers to development of environmental technologies in California
 - Learned about the system of environmental regulation
 - Should have hired or used committee consultant with policy expertise
 - Knowledge = power
 - Our irrelevance to the large economy as modeled by this game
-

Other Comments? Important list of events and activities

- Observation: Generally poor at conveying complex issues (e.g. examples) in concrete accessible terms
 - Observation: Little interaction with business; disjunction of organizational objectives of business, government
-

Passed

1. 1997 Environmental Reorganization Act passed. This bill establishes a technology certification program for technologies. All Air Quality Districts are placed under the authority of CAL/EPA.
 2. 1995 (Federal) National Technology Program. This bill establishes a National Technology Certification Program for environmental technologies. A pilot project with CAL/EPA is also established.
 3. 1997-1 Pilot Certification Center. This bill establishes a \$3.0 million fund to assist small businesses in the certification of environmental technologies at the pilot San Manuel Military facility.
-
4. 2000-1 Loan guarantee for High Technology Enterprises. This bill appropriates \$1.0 billion in loan guarantees for loans up to \$50.0 million.

Held in Committee

1. 1999 Zero Emission Diesel. This bill would require no NO_x engine supplements by the year 2010 in California.

Defeated

1. HR-2000-2 Abolish EPA. This bill would abolish the EPA and mandate that the US Dept. of Interior would establish standards for environmental technologies.

Analyst's Report

The central themes of this analysis are:

- *the redevelopment activities of these games were centered at the local level of government and were often independent legislative activities.*

- *use of the political process to achieve desired outcomes was primarily affected by citizen environmental groups and local government officials not business or their advocacy groups.*
- *the legislative team responded to these groups; however, the legislature focused its legislative agenda on macro level environmental issues and then adapted legislation to the redevelopment activities based upon the priorities advocated by citizen groups and local officials.*

TEAM CHARACTERISTICS

Team characteristics are shaped by both external forces on, and values held by individuals. This analysis will identify those forces and values and examine how the team characteristics were shaped by them.

Who were the team members?

This team consisted of individuals who were experienced in political campaigns, the legislative process, and governance from the perspectives of practical experience and academic training. Two team members were legislative staff members who had worked for their legislator's campaign, another was a lobbyist for a non-profit organization, one participant was a former member of the California legislature for eight years, as well as a formal local, elected official for four years. Finally, one member was writing a dissertation for a doctorate at the Kennedy School of Government at Harvard and also worked for the non-profit lobbying organization. All other members had master's degrees in various social science disciplines such as political science, social anthropology or business.

What was the world view of the team?

The world view of the team was shaped by the legislation which was provided at the start of the game which is typical of a legislative calendar. Often bills are introduced and circulated at a point of departure for discussion with no expectation of becoming law in the current form. The "spot legislation" included three California bills and two US bills. One California bill addressed the issue of multi-media permitting, and was reinforced by a US bill which focused on standards for multi-media permitting.

The team chose to represent the California legislature and shape events from the state perspective. There were two reasons for this approach. First, California has a strong track record in devising redevelopment and environmental solutions, often leading the Nation in innovative policy. Second, given the time and constraints of the game, acting as a state and national legislative body was not practical given the pace of enacting legislation.

However, this approach did not hold. Toward the latter part of the game, federal legislation was needed as a compromise solution between business and environmental groups. In order to adopt

and invest in new technologies, business needed uniformity and the larger market of all states. Federal legislation, US Bill HR 1995-1, provided this solution.

TEAM OBJECTIVES

- To be players in the games.
- To propose a legislative agenda that would stimulate debate and involvement in the legislative agenda.
- To provide openness and access.
- To balance macro level planning with the demands of special interests.

A major unanticipated outcome was an almost total lack of interaction between all other teams with the legislative team for the first half of the game. The legislative team attributed this early outcome to the following reasons:

1. Organization, debate and setting of priorities for a course of action by other teams.

2. Complexity of game.

3. Inexperience of players in legislative politics.

4. Belief that the legislature was in gridlock and would be unable to address or solve problems of game scenarios.

Consequently, the legislature very quickly readjusted and responded by going out to their constituencies to hold meetings with key leaders. The legislators also responded by holding hearings through lunch, and at other convenient times. It was recognized that a policy of engagement was necessary for the legislators to be players rather than observers. The strategy was successful with local officials, citizen environmental groups, and the public officials representing environmental agencies.

In the course of reformulating strategy, the legislative team proposed new legislation which would stimulate debate. In so doing, the team sought to balance macro-level planning through the policy making process with the now emerging demands of the various special interests.

However, business and their representatives remained largely absent. Discussions of this analyst with the analyst for the business team revealed that the players for the business teams were skeptical of the legislative process and preferred to interact with other teams directly in solving issues and barriers.

TEAM CONCLUSIONS

- Early on, learned about regulatory barriers to development of environmental technologies in California.
- Learned about the system of environmental regulation.
- Should have hired or used committee consultant with policy expertise.
- Knowledge = power
- Our irrelevance to the large economy as modeled by this game.

Similarly to the non-game world of the legislature, individual legislators often do not have a detailed understanding of subject matter of their committee. This knowledge is accumulated over time. Indeed for most of the game, the legislature functioned as a permanent environmental committee rather than a general legislative body. Therefore, the majority of the above stated conclusions contain a theme of learning about the subject at hand - environmental regulation and the complex system of decision making the regulations evoke. The diagram shown in **Chronology and Highlights** is indicative of the time spent in learning. The legislature held a special hearing and asked Ms. Jennifer Hernandez, an attorney practicing environmental law for business clients, to answer the following question, "In the environmental regulatory system in California, where does local, regional, state and federal control end?"

A second theme is, "knowledge equals power." Those legislators who were able to quickly grasp the details of regulation and its corresponding system, were able to build consensus, craft solutions, and wield influence. Stated another way, those legislators built a power base. An example of the articulation of accumulated power into action was Glen Gilbert, Assemblyman from Grimesville. Mr. Gilbert was the only legislator who secured substantial federal funding for job training for his constituents. Mr. Gilbert was the first legislator who recognized the importance of interaction between the legislative and other teams and suggested a reformulated proactive strategy.

NOTABLE QUOTE

At one point, the legislature was debating HR-1995-1 Abolish EPA which was described as "a great double whammy." The proposal, given by Glenn Gilbert, Assemblyman Grimesville, was: to accept national standards and abolish the Environmental Protection Agency; then, give the function to the US Department of the Interior.

The reply by Dora Menoshi, Assemblywoman, San Manuel: "That's like a national laboratory running a hotel." This bill was defeated in committee.

AREAS FOR IMPROVEMENT

This proposal could significantly change the dynamics of future games. Recruit professional lobbyists for legislative team from business associations.

YELLOW TEAM: SUPPLIERS

Chronology and Highlights

Objectives:

Rules for making decisions - consensus - bottom line - majority vote

Yellow Team Purpose -

- Multi-faceted project team
- Make money
- Stay in business
- Serve the customer
- Bring resources to the environmental issues
- Provide services of true value
- Validate technology (T&E)
- R&D new technology
- Develop our credibility
- Interact between all teams

What must happen for the Yellow team to declare the event/the team a success

What shall we do to achieve success

Full Service Supplier of Environmental Services

8:42 am - Babco came for support to verify technology for 200 mi battery

Who we are:

Company name: SYP (Solve Your Problems)

- Full Service Supplier
- R&D
- Validate technology (T&E)
- Communications & Education
- Financial services
- Strategic planning/integration of technology with policy
- Environmental impact statements

8:55am - Electra wants to have technology validated (set appt 9:30)

- what will cost be
- org must be validated by EPA

Yellow Team Success:

- Customer success
- Better environmental solutions
- Create a reasonable return on our investments

9:18am - Babco came to see progress - set appt. for 10:00am

9:20am Gave press release to media to advertise services available from Yellow Team.

9:22am - Mayor of Grimesville wants to announce creation of advisory committee for the greening of Grimesville and wants representative from Yellow Team to participate on committee.

9:28am - Yellow Team still trying to decide who they are.

9:32am - Electra appt -

Here to get validation of technology

Independent testing of small area (1 acre of the 5 acre site)

Verify 1 acre test site is clean compared to other 4 acres

Electra will evacuate vapor out of soil

Want Yellow team to verify soil is clean

Want Yellow team to test vapor from contaminated soil & after vapor is cleaned

Want Yellow team to verify no toxic vapor is released in air

Yellow Team - 3 areas to concentrate on:

- Technical services
- Management services
- Public communication & education

10:00 am - Pat Kearney meeting with Mayor of Grimesville to see about advisory committee

10:00am - Lora Lee going to Green teams to see how Yellow team can help Green teams. Steve Jordan going to Blue teams to see how Yellow team can help.

10:02am - Babco returned to work out agreement with Yellow team

- Agreement #1 signed between Babco & Yellow Team

Perform a risk assessment of plant construction methods and technology. Analyze plant overall performance - 99.9% probability rate. Funds of \$375K transferred to Yellow from Blue #2. Successful.

- Agreement #2 signed between Babco & Yellow Team

99% probability rate for 200 mile battery within 6 months. Yellow team gets 10% of net profits from battery sales. Blue Babco has exclusive rights to the technology. Yellow & Blue team sign proprietary agreement. Funds of \$1.5M transferred to Yellow from Blue #2 . Successful

Session 2 - 10:56am - January, 1996

10:50 - 11:30 Team met on patio to discuss open deals - 7 of the 10 deals were brought to closure within the team for members to negotiate with the appropriate teams. Comments were made by Melanie & Lora Lee such as: "I need to have an overview of where we are now."

(10:55) "Given the information, I'm off to negotiate two agreements with the DoD & Behemoth."

Melanie & Lora Lee are driving the team. Two Lab guys are analyzing issues beyond a reasonable level in order to minimize lab risk. Patricia is taking action which assures team and affiliate's compatibility.

11:45am - Agreement between Purple (Urban Sprawl) and Yellow Team
Yellow team agrees to perform an assessment of the urban sprawl property to determine historical use and likely (predicted, not sampled) contamination levels and type of contaminants. It is understood that a more complete sampling program will be required to determine actual levels. Funds of \$200K transferred to Yellow team from Purple Team.

12:30pm - Agreement between Blue CUTS/Electra for independent testing of Electra's Remediation process. The test will be for 8 weeks starting July 1, 1995 and include: 1) test of input waste stream & 2) test of output waste stream. Probability of success is 95%. Funds of \$200K (\$190K cash & 10K Karma Kard) transferred to Yellow team from Blue CUTS/Electra. Successful

12:56pm - Agreement between Blue #1 Restore & Yellow Team to perform a site characterization study of the proposed San Manuel AFB proposed landfill. An earthquake, water & ecological study will be performed by state-qualified, hydrologist, geologists, seismologists & ecologists. Determine that the site is acceptable for the landfill. Funds of \$1M transferred to Yellow team from Blue Team. Successful

1:00 pm - Lora Lee and Len went to Red L team to make appt to discuss creation of test facility - appt set for 1:30pm.

1:05pm - Agreement between Yellow Team and Purple Team (Mayor of Grimesville) to assist and facilitate the development of the Greening of Grimesville Advisory Committee. This includes: 1) Building alliances with stockholders - giving each a voice. 2) Manage process at several meetings, establish city-wide goals & objectives. 3) Assist with evaluation and recommendation. 4) Duration 1 yr. 5) will attend first meeting free; fee half price. Funds of \$150K transferred to Yellow team from Purple team (mayor).

1:20pm comment made from Steve Jordan that for the next Prosperity Game to have more than one Yellow Team (suppliers) to have competition. There is now no competition so Yellow team can charge whatever they want.

Session 3 - 1:30pm - January 1, 1997

1:35pm - Agreement between Blue #4 Behemoth and Yellow Team to do preliminary site assessment using 3 sample wells and 20 soil samples and historical research to determine the potential degree of contamination on 100 acre site directly south of foundry site. Additional costs resulting from positive funding to be determined. 75% probability. Funds of \$100K transferred to Yellow team from Blue Behemoth. Failed.

1:45pm - Agreement between Yellow Team and Green Government Regulators for California certification for testing Laboratory. Success performance samples leads to certification. 99.5% probability of success. Funds of \$10K transferred to California Regulators from Yellow Team. - Successful.

2:14pm - Agreement between Yellow Team & Blue Restore to evaluate performance of liner system. Bench scale testing to simulate conditions of soil, contents, conditions on accelerated time. 97% probability success. Funds of \$150K transferred to Yellow team from Blue Restore Team. - Successful.

2:40pm - Agreement between Yellow Team & Blue CUTS for groundwater testing success. Electra will conduct an eighteen hour field test to clean 46 acre/feet of ground water. The test will occur 11/1/96. Yellow agrees to test the input and output streams with a 97.5% success rate. Funds of \$50K transferred to Yellow team from Blue CUTS. - Successful.

3:15pm - Agreement between Yellow Team & Blue ROCAR to sample and analyze for VOC & tox, NOX & CO at influent & effluent of Clohi thermal oxidation unit. \$1,000/sample x 2 samples/day x 2 weeks = 28,000 - 50% probability of success. Increased probability of success as determined by probability graph to be completed within the first 45 days of the installation of the prototype (8 months from 1st day). Funds of \$56k transferred to Yellow team from Blue ROCAR.

Session 4 - 2:57pm - Feb 1, 1998

2:59pm The state legislature appropriates \$3m to CAL/EPA to fund the establishment of a pilot certification center at San Manuel Military Facility on a matching funds basis (not to exceed \$2m) and establish a fund to assist small businesses in the certification of environmental technologies.

2:50pm Agreement between Blue Behemoth & Yellow Team to perform a one 150 acre site assessment, feasibility study & plan for remediation. Yellow to work with Behemoth to obtain regulatory approval & permits for the plan. Yellow to manage remediation project. Appropriate indemnification & liability protection will be put in place to protect Yellow. Funds of \$1.4m transferred to Yellow from Behemoth. - Successful

3:00pm - Agreement between Purple (Mayor), Green Environmentalists, Green Public & Yellow to participate on the Mayo's Greening of Grimesville Advisory Committee.

3:00pm - Agreement between Purple (DoD/DOE) & Yellow team to evaluate landfill remediation. Design for adequacy of compliance of environment regulations. 95% probability. Funds of \$150k transferred to Yellow Team from DoD/Restore/San Manuel. - Successful.

3:06pm - Agreement between DoD Purple & Yellow. DoD will allow exclusive use on 50 acres at the AFB for a period of 5 years, subject to approval of City of San Manuel. The site will be sued by Yellow team for establishment of a technology demonstration/verification center.

Yellow will provide \$100,000 (one-time donation to San Manuel with limited indemnification to DoD/City for cross contamination.

2:30pm Agreement between Yellow team & Blue ROCAR to construct in 8 months small scale lab model to demonstrate ROCAR/VOC treatment technology (including a fab/testing/sampling/diagnostic instrumentation. Provide analytical process model. Verify analytical model by comparing lab model data to analytical predictions. Funding of \$1m transferred to Yellow team from Blue #3 ROCAR. Successful.

2:30pm - Lora Lee will act as speaker for the group at final session Friday. Patricia will be on the Environmental Summit Committee Thurs afternoon.

4:05pm Environmental Summit Meeting

5:00pm Innovator Polling

Friday, March 31, 1995 - Session 5 - 8:00am - January 1, 1999

8:10am Finance came to offer proposal to do joint venture.

8:20am Babco came to have one of their requirements approved.

8:25 am Purple came to get site assessment.

8:30am - Prosperity Games Journal announces massive funding CUTS and layoffs at federally funded laboratories and universities because of the balanced budget amendments.

8:53am Layoff of one employee (Len Hiles). He was given \$100k as a sweetener and promised another \$100k severance pay.

9:00am Steve & Lora Lee went to hire attorney to write the agreement with the Red Finance team for the joint venture. Attorneys were overbooked and would not take the work.

9:15AM Yellow team went to hearing concerning data given to Urban Sprawl in an agreement from yesterday. Green Regulators accepted information provided by Yellow team.

8:50am - Agreement between Yellow Team and Blue #3 ROCAR team to increase VOC, tox NOX & CO test program at influent & effluent of Clohi thermal oxidation unit. 1000/sample x 2 sample/day x 2 weeks. 24 week additional 104k x 5% vol discount. Final report due 4 weeks after final sample. Periodic reports 3 times/6 mo. 98.8% probability. 10 to be completed/7 mo from today. Funds of \$198K transferred to Yellow team from Blue 3. Successful.

9:20am Blue #1 Restore has Karma Kard for \$1m for national labs to do research and development to analyze system & research for Grimesville site.

9:27am Blue CUTS wants soil sampling in Sector 1.

9:30am Blue Clohi came to request fabricators - was turned away - suggestion given to go to entrepreneurs.

9:25am Agreement between Yellow Team and Babco for assessment of safety & health plans, emergency, water analysis plan, operation plan per CAL/EPA requirements. Utilize certified industrial hygienist and regulatory specialist. Funds of \$110k transferred to Yellow team from Blue Babco. Successful.

9:40am Agreement between Yellow Team and Blue Electra to do site assessment at RR Right of Way Site I using 3 sample wells and 20 soil samples to define the potential degree of contamination with a statistical probability of contamination Level 8. Funds of \$100k transferred to Yellow from Blue Electra. 20% contamination of soil and ground water VOC.

10:10am Agreement between Yellow Team and Blue 4 CUTS/Behemoth for determining extent of contamination and identify plumes for 100 acre south portion of Behemoth property. Funds of \$100k transferred to Yellow team from Blue CUTS/Behemoth. Medium contamination.

10:20am Agreement between Yellow team and Blue Restore to evaluate performance in a field test of the whole Restore landfill system and evaluate the Grimesville site for appropriate for Restore technology. Funds of \$1m transferred to Yellow team from Blue Restore.

Session 6 - 10:37am - January 1, 2000

10:40am Agreement between Yellow Team and Blue CUTS to establish a \$100k Research contribution to be named the "CUTS Loves Research Fund" to support the important R&D of the Yellow Team - specifically this fund will contribute to research seeking solutions to innovative environmental technologies. This is a contribution and should provide tax breaks for CUTS.

10:58am Agreement between Yellow Team and Blue CUTS/Behemoth for remediation plan for VOC in GW by Electra - needs approval by state. Analytical assessment of verification cleanup success based on prior knowledge of contamination baseline previously established. Funds of \$40k for first part and \$100k for second part transferred to Yellow team from Blue CUTS Behemoth. Both parts successful.

10:27am Agreement between Yellow Team and Red Finance team to complete a prototype model of a NO_x free diesel engine. It has a 97% probability of success. Yellow team will grant to RFP an exclusive license with rights to sublicense. Consideration to Yellow team will be \$10M in development costs plus \$500K per year for 5 yr plus \$1m per year after that. License for diesel use only. All other rights are Yellow team's. Yellow team warrants all patents are valid, current.

10:30am Agreement between Yellow Team (Melanie) and Red Legal team for legal advice for future litigation and advice.

11:44am Agreement between Yellow Team and Red Finance team to verify efficiency, the NO_x diesel engine for the elimination of NO_x. Need 3rd party verification. Lora Lee, the consultant, has international credentials in this technology. Funds of \$50,000 transferred to Yellow team from Red Finance team.

11:45am Other team members did not agree to the agreement between Yellow team and red legal team. Team members Melanie & Steve took the \$10m and went to Brazil.

11:48am Agreement between Yellow team and Red Legal team for consultation. Funds of \$10k transferred to Red Legal team from Yellow team.

11:53am Agreement between Yellow team and Blue #1 to install two ground water monitoring wells - one will be installed upstream - one will be installed downstream. Funds of \$20k transferred to Yellow team from Blue #1 team.

12:00pm Agreement between Yellow team and Red Legal team for extradition documents and to freeze assets of 2 employees. Funds of \$100k transferred to Yellow team from Red Legal team.

12:40pm Melanie & Steve returned from Brazil with the \$10m they had taken.

12:50pm Agreement between Yellow team and Green Env Team for Yellow team to be onsite during testing and no adverse ecological effects of cleanup procedure. Funds of \$50k transferred to Yellow team from Green Env. team.

1:16pm - Received \$400k from Blue CUTS for additional funds donated to the Research Endowment agreed to earlier.

1:24pm Agreement between Yellow team to provide technical oversight/verification/validation of CUTS results. Independent split samples (10) write report for submittal to regulatory agencies, VOC, removal, demonstration on 1 acre site. Funds of \$50k transferred to Yellow team from DoD/CUTS

1:28pm - turned down agreement with Blue Babco Team for equity position for \$20m.

1:27pm - turned down agreement with Blue 1 Restore for equity position for \$20m.

1:30pm Agreement between Yellow team and Blue Restore for a contribution to establish an Institute of Good Environmental decision making and problem solving. Restore's contributions will be added to a contribution by Yellow team of \$1m. Restore will have a presence on RA Committee. Funds of \$400k transferred to Yellow team from Restore.

1:30pm Game play ceases.

2:00pm Final Radio/TV news broadcasts

2:05 Plenary Session - Players from each team gave presentations

4:30pm Final briefing and analysis & innovator polling

YELLOW TEAM BALANCE SHEET

30 March - 8am - Beginning Balance	\$ 2,000,000
10:02am - Received from Blue Babco	+ 1,875,000
10:45am - Received from Purple Urban Sprawl	+ 200,000
- Tax levied	- 500,000
12:27pm - Received from Blue CUTS	+ 200,000
12:56pm - Received from Blue #1	+ 1,000,000
1:05pm - Received from Purple Team	+ 150,000
1:30pm - Received from Blue Behemoth	+ 100,000
1:45pm - Transferred to Regulators	- 10,000
2:15pm - Received from Blue Restore	+ 150,000
Karma Kard received from ?? for consultant time	+ 10,000
2:27pm - Received from Blue ROCAR	+ 1,000,000
2:35pm - Received from Blue Behemoth	+ 1,400,000
2:40pm - Received from Blue CUTS	+ 50,000
2:45pm - Received from Blue ROCAR	+ 56,000
2:56pm - Received from Purple DoD	+ 150,000
 Total at end of day	 \$ 7,831,000
 31 March	
8:45am - Received from Blue Big Oil	+ 200,000
9:29am - Received from Blue CUTS	+ 100,000
9:25am - Received from Blue Babco	+ 110,000
(Part of \$1m grant from Karma Kard)	
9:54am - Received from Blue Behemoth	+ 100,000
10:22am - Received from Blue Restore for R&D	+ 1,000,000
10:42am - Received from Blue Behemoth	+ 2,000,000
10:45am - Received from Blue #4	+ 40,000
10:46am - Received from Blue #4	+ 100,000
10:52am - Received from Red Finance	+ 10,000,000
10:59am - Received from Blue #4	+ 100,000
11:09am - Paid to Red Lgl (Yellow team members absconded)	- 10,000,000
11:45am - Received from Red Finance	+ 50,000
11:46am - Paid to Red Legal for advice	- 10,000
11:56am - Paid to Red Legal for extradition of team members	- 100,000
11:53am - Received from Blue #1	+ 20,000
12:40pm - Returned from extradited team members	+ 10,000,000
12:50pm - Received from Green Environmentalists	+ 50,000
1:08pm - Received from Purple Urban Sprawl	+ 100,000
1:16pm - Received from Blue CUTS	+ 400,000
1:18pm - Received from DoD/CUTS	+ 50,000
1:30pm - Received from Blue Restore	+ 400,000
 Total at the end of two days	 \$ 22,541,000

Post-Game Debriefing: Presenter - Lora Lee Martin

Team Goals

- Provide services of true value (stay in business)
- R&D new technology
- Validate technologies

SYP (Solve Your Problems)

“These guys are really under the gun. There is a significant amount of stress”

Issues

- Competition vs. consortium
 - diversify strength
 - understanding/trust
- Ethics; with whom/conflicts of interest (Brazil)
- Scope of Services/Activities
 - reactive/requirement driven
 - very little R&D

All Initiated by SYP:

- Institute for Good Environment (Restore) \$400,000 + SYP (vs \$5M/public)
- CUTS Loves Research Fund \$500,000
- Technology Test Facility Legislative Initiated \$2M SYP \$1M

If we are going to make a lot of money \$\$\$\$\$, then ethics aren't important!"

\$2,000,000 \Rightarrow \$22,441,000

Analyst's Report

The Yellow Team gathered for dinner and began to get to know each other. They decided not to work beyond Marshall's presentation and to meet at 8:00 in the morning as identified in the agenda.

Everyone arrived on time, eager to play the game. The first hour and a half was spent defining the team's rule for making decisions, the team's purpose, role and success criteria. The team basically decided decisions would be made by consensus and if consensus was not achievable, then the majority would rule. They decided their purpose was to provide services of true value. In providing this service, their goals were to serve the customer, stay in business and to make money. They would achieve this by providing research and developing new technologies, and by validating industry developed technologies. They also felt it was important to develop and maintain credibility as a provider. The team named themselves SYP Company for "Solve Your Problems". Their roles were research and development, technology teams and evaluation, communication and education, strategic planning, and financial services. The Control Team disallowed the Yellow Team providing financial services as being beyond their scope. The team determined as success criteria that, first and foremost, their customer be successful, and second, they would be part of the development of better environmental solutions. And finally, they would create a reasonable return of investment.

During the process of defining their roles, etc., Babco requested the Yellow Team's services for the development of a 200 mile battery. Because this happened so early in the morning, the Yellow Team was taken by surprise that someone really wanted their services. They told Babco they were interested in providing such services but they needed to prepare for the rest of their work and asked them to come back later. One half hour later Babco returned but the Yellow Team delayed once again for another 45 minutes as they were not ready. While the Yellow Team was determining its roles and responsibilities, the mayor of Grimesville approached the team requesting their services on the Community Advisory Committee. They told the mayor they would consider it and get to her as soon as possible. The Yellow Team continued to define who they were. Electra Company approached the team and wanted validation of a technology they had for a five acre site which needed environmental cleanup and they wanted an independent study of their technology and its impact on one acre of the site. The Yellow Team got really excited about this as it was a technology that two or three team members had personal knowledge. As those two or three discussed in incredible detail the aspect of the service, other members worked to conclude the areas of concentration of the Yellow Team.

At 10:00 a.m. three of the members of the team left: one to strike a deal with the mayor of Grimesville and the other two to market the Yellow Team services to both the Green Team and the Blue Team. Upon their departure, Babco returned to complete an agreement. Two agreements were created. The first agreement was to perform a risk assessment of the plane construction methods of Babco. The Yellow Team received \$350,000 for this work, and the role of the dice proved the methods risk free. The second agreement was for the Yellow Team and Babco to jointly develop and commercialize a 200 mile battery. For their effort, the Yellow Team would receive 1.5 million dollars and 10% of the net profits of battery sales. My observation was that the people on the Yellow Team did not attempt to contractualize their financial arrangements in this case. For example, 10% of the net profit was not time sensitive, therefore no one knew when they would be paid over the course of the five years of the game. At this point, it appeared two members would stay at the Yellow Team table while the remaining members would move around to market their services and fulfill contracts and agreements. Pat

Kearney struck an agreement with the mayor and got the majority of the Yellow Team members to approve her work.

At 10:50 a.m. the team moved to the patio. This happened while the recorder was away from the table. The team decided it needed fresh air and the ability to talk openly and freely. A note was left on the flip chart for the temporary location. Two members of the team appeared to need more information about the group's activities.

It was obvious by now that two ladies were moving the team forward: Melanie and Lora Lee. The two representatives of the national laboratories analyzed all the agreements in great detail while the gentleman from the financial sector was slowed somewhat by the Control Team's rejection of his financial services plan. Patricia was now working with the mayor's advisory council somewhat independent of the Yellow Team.

Just before lunch, a member of Urban Sprawl and members of the Yellow Team agreed to assess some specific property to determine the possible contamination levels on that property. An agreement was negotiated.

Patricia had been off at least two hours working with the mayor and at 12:00 noon she requested a meeting of the entire Yellow Team. This meeting was scheduled for 12:45 p.m. Everyone agreed to be at this meeting. The purpose was to bring everyone up to date on the status of the agreements signed at that point. Patricia was then called away to facilitate one of the mayor's meetings. At the agreed upon time, the update meeting took place even though Pat never showed up.

Just after lunch, Lora Lee and Lynn approached the legislators seeking an allocation of funds for a test facility.

Steve Jordan commented that in future games there should be more than one Yellow Team in order to create competition. His comment was that without competition the supplier could charge whatever the market could bear. In listening to other participants in the game, including analysts and facilitators, I over heard comments which stated the Yellow Team was providing services at an incredibly cheap rate while the Yellow Team members felt they were charging comparatively high rates.

Over the course of the afternoon several agreements were reached. Of all of the agreements created by the Yellow team only one failed. Team members were excited by this failure. (I believe the excitement came from knowing that this failure made wins more valuable. If you never experience failure, the excitement of winning is minimized.)

During the afternoon, one or two members of the team would independently create agreements and eventually advise available team members about their activities.

By February 19, 1998, or 2:57 p.m., it was determined that the legislature would appropriate three million dollars to the California EPA for the establishment of a pilot certification center at

San Manuel Military Facility. Members of the Yellow Team were upset with this decision and disappointed with their negotiating skills as they had requested the legislature to directly fund the Yellow Team for this facility. Never once did they suspect the legislature would fund it to their own agency and that they would then have to go negotiate with that agency for funding. (Based on my own experience with state and federal groups, the way the legislature funded the project is standard.)

By 4:00 p.m. the Yellow Team was making lots of money and successfully negotiating and completing its agreements and was beginning to get bored. To stimulate play, the Control Team agreed to remove two of the players in the morning and have them join the Babco Blue Team.

Friday morning, 8:00 a.m., two of the team members were late. The Finance Team came to the Yellow Team and proposed a joint venture. The Yellow Team considered this and within an hour was successfully negotiating an agreement. They requested an attorney to prepare the written agreement. The Yellow Team members were dismayed to discover the attorneys were overbooked and did not have time for this activity.

At 8:30 a.m. the Control Team announced funding cuts and layoffs at the national laboratories. Marshall and I decided to layoff only one person from the Yellow Team since one of the late persons still had not shown up.

The Yellow Team had been approached to work with Urban Sprawl and decided early to discuss the ethics of the Urban Sprawl management. People on the team felt that Urban Sprawl was unethical because it was part of an investigation concerning bribery of state regulators. Even after they learned the truth that the FBI had set this up as a sting operation to catch the regulators accepting bribes, the Yellow Team wanted to protect their reputation with the players at the game.

The Yellow Team had begun to make substantial amounts of profit if you ignore operating costs, which they did. One of the team members wanted to set aside 20% of their profit for the establishment of an organization which would develop good environmental decisions. Another wanted to set aside 25% of the money for contingency of general liabilities. The interesting thing to me was the team started the game with two million dollars, and they were now showing an asset base greater than four million dollars, and they had decided to start taking a conservative approach to current and future expenditures.

At about 10:30 a.m. several members of the Yellow Team discussed the possibility of embezzling ten million dollars of their funds and running off to Brazil. People joked about this and several members continued to negotiate agreements. Two people, Steve and Melanie, left at 11:30 a.m; they took ten million dollars from the recorder, Kristie, and went to Brazil (the patio). This occurred while I was away from the table but nearby. Seeing these two leave the table, I followed them to the patio and asked them what they were doing and what would it take to get them back into the game. Their response was they needed to be arrested and extradited from the country. I chose to discuss this with Marshall and looked for a course of action. We agreed to stop that form of play and sent them back to their team. Melanie and Steve returned with the

money about 12:30 p.m. They consumed a considerable amount of my time during that period. I am not sure, but I sensed the team members that were not embezzlers were disappointed with the action taken, because as a team they had determined not to go to Brazil.

This team got bored because they increased their liquid assets and money became meaningless. In addition, agreements between negotiating teams were extraordinarily easy; and finally, Yellow Team's ability to be successful was almost a given. No matter what they did, they expected and almost always received a successful outcome.

[In the future, the game may be designed to assess certain teams a cost of doing business. This would introduce costs to teams like the Suppliers that currently have mostly revenues, but not expenses.]

APPENDIX K: SOME ENVIRONMENTAL BACKGROUND INFORMATION

from "EPA Environmental Technology Initiative: FY1994 Program Plan," USEPA, EPA 543-K-93-003, January 1994:

"The focus of this activity will be long-term research and pollution prevention by EPA, other Federal agencies, and the private sector. The goal is to develop more advanced environmental systems and treatment techniques that can yield environmental benefits and increase exports of "green" technologies. This investment will aid in the transition away from a defense-oriented economy, by stimulating the increased use of private sector R&D resources for environmental quality-related purposes."

"The *U.S. EPA Technology Innovation Strategy* (EPA/542/K-93/002) outlines four strategic approaches through which EPA intends to accomplish the President's goals:

1. Adapt EPA's policy, regulatory and compliance framework to promote innovation;
2. Strengthen the capacity of technology developers and users to succeed in environmental technology innovation;
3. Strategically invest EPA funds in the development and commercialization of promising new technologies; and
4. Accelerate diffusion of innovative technologies at home and abroad."

"... EPA will attempt to bring the benefits of pollution prevention to small businesses by acting as a convener and partner, a collaborator in technology diffusion, and an educator."

"IMPROVING COMPETITIVENESS OF U.S. ENVIRONMENTAL TECHNOLOGIES:

The U.S. Technology for International Solutions (U.S. TIES) is an inter-agency technology diffusion program designed to enlist greater participation of the U.S. private sector in achieving U.S. environmental objectives overseas...."

"CLEAN TECHNOLOGY USE BY SMALL BUSINESS:

- EPA should lead by "steering" more than "rowing" in the planning, development, commercialization, and diffusion of technology; and
- EPA should, in addressing the barriers to small business achievement of cleaner technology, emphasize approaches that increase partnering, collaboration, and leveraging."

From "EPA Technology Innovation Strategy," External Discussion Draft, USEPA, EPA 543-K-93-002, January 1994:

"SUMMARY OF EPA'S FOUR OBJECTIVES:

Objective #1: Adapt EPA's policy, regulatory and compliance framework to promote innovation.

Objective #2: Strengthen the capacity of technology developers and users to succeed in environmental technology innovation.

Objective #3: Strategically invest EPA funds in the development and commercialization of promising new technologies.

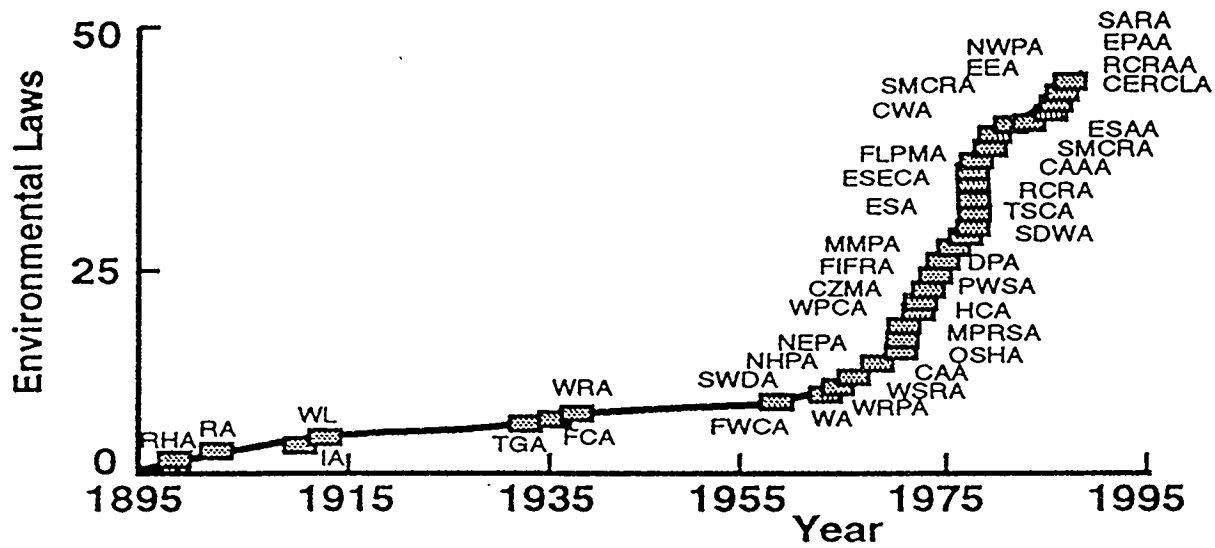
Objective #4: Accelerate the diffusion of innovative technologies at home and abroad."

"EPA will actively establish and strengthen working partnerships with other federal, state and local agencies in striving to meet its technology objectives."

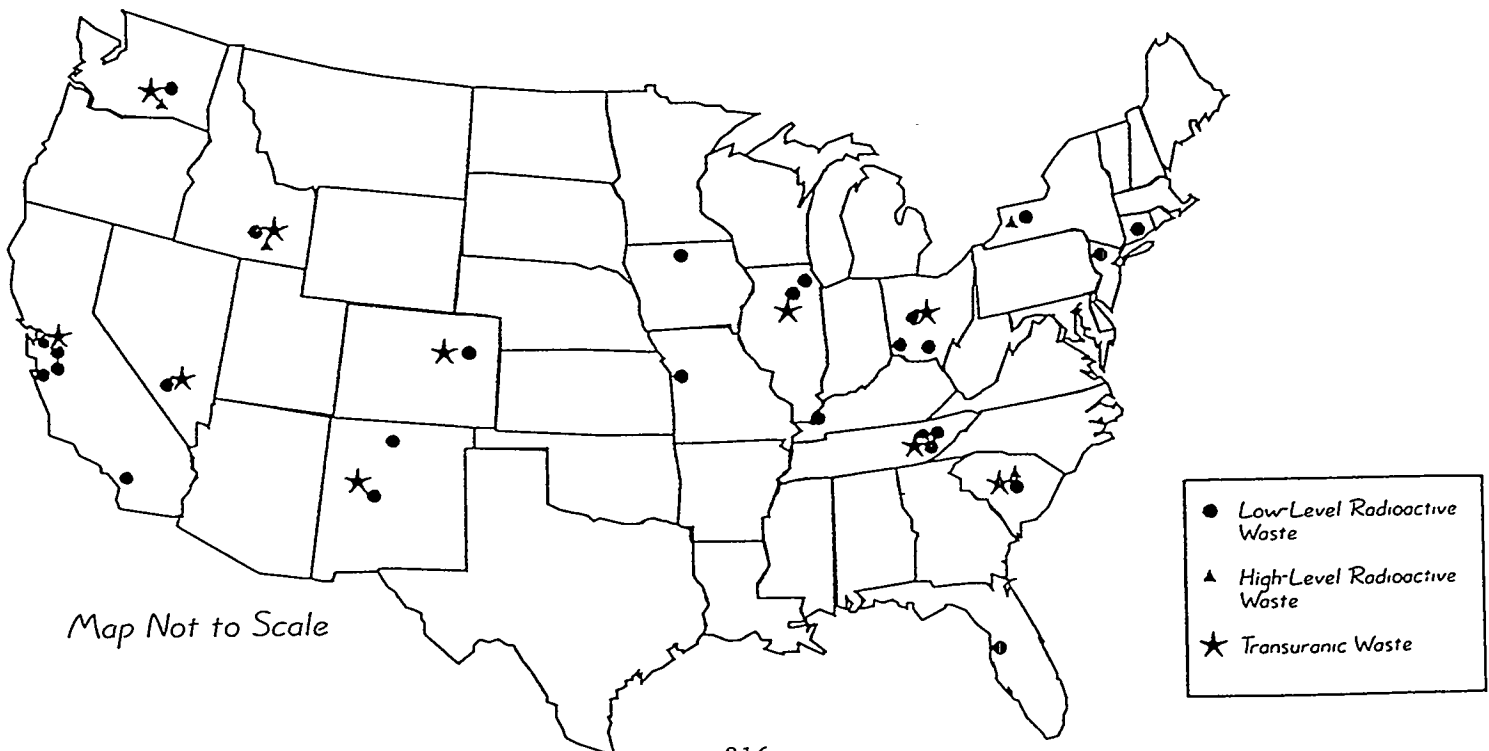
"EPA and state environmental agencies need to become better partners with the private sector in helping to bring critical new technologies to commercialization and widespread use. For example, ... government agencies can help reduce risk for innovators in the environmental technology market by convening public-private partnerships that target, collaborate, and co-fund research and development of innovative technologies; by supporting their testing and demonstration so as to provide credible documentation of their performance; and by improving governmental policies. These efforts will be most effective if EPA and its state counterparts undertake them collaboratively."

EPA Administrator Carol M. Browner:

"In every way that EPA intersects with industry - in rulemaking, in permitting, in reporting requirements, in enforcement, in technical assistance - are we doing everything we can to meet our health and environmental goals in the most efficient and effective way? Are we providing the flexibility businesses need to meet our health and environmental goals in the way that works best for them? Are we doing everything we can to be cleaner and cheaper?"



DOE Waste Generation, Storage and Disposal Sites



BRIEF HISTORY OF MAJOR U.S. ENVIRONMENTAL LAW

RIVERS AND HARBORS ACT - 1899: Its primary intent was to prohibit the disposal of solid objects into waterways that could create a hazard to navigation, but did not specifically address waste disposal as an issue in and of itself. It prohibited the creation of any object that could possibly interfere with the navigability of any United States waterway. Despite this Act, no significant regulatory actions were created during the first half of the twentieth century. At the beginning of this century industrial waste disposal was not believed to be a serious problem by either the private or public sectors.

ATOMIC ENERGY ACT - 1954: This Act was intended as a revision to the Atomic Energy Act of 1946. Its purpose was to provide for civilian participation in such programs as research and development and the production of nuclear power and to broaden the Atomic Energy Commission's power to include the regulation of all programs involving the use of atomic energy.

AIR POLLUTION CONTROL ACT - 1955: This Act required the US Public Health Service (PHS) to carry out extensive research and to assist the states and local communities in the control of air pollution. It was the first real attempt in the US to address the problem nationally. It is viewed as the Clean Air Act's predecessor.

CLEAN AIR ACT (1) - 1963: This Act enlarged the duties of the PHS by providing for an accelerated research and training program; established a program of matching grants to state and local agencies that initiate their own air pollution control mandates; and provided for the development of specific air quality criteria.

CLEAN AIR ACT (2) - 1967: This Act required the PHS to study the cause and effect aspects and designate those pollutants considered to be of major concern. After the study, Criteria Documents were to be issued on individual pollutants citing actual levels of concentration in ambient air at which point unfavorable effects would result; identify known methods for emission control; and study the regions within the US where common or uniform pollution control regulations should be established. The Act also required states to adopt air quality standards compatible with the PHS-established Criteria documents.

CLEAN AIR ACT (3) - 1970: The major focus of this revision was to transfer responsibility for the Clean Air Act's implementation to the new Environmental Protection Agency; this Act was amended again in 1990.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) - 1970: President Richard Nixon signed into law the National Environmental Policy Act on January 1, 1970, and a decade of environmental legislation followed. The responsibility for implementing and coordinating NEPA was given to the Council on Environmental Quality, a new branch agency.

CLEAN WATER ACT (CWA): Established in 1972 with the passage of the Federal Water Pollution Control Act (FWPCA) Amendments. The CWA has been the subject of two major amendments - the Clean Water Amendments of 1977 and the Water Quality Act of 1987.

FEDERAL INSECTICIDE, FUNGICIDE AND RODENTICIDE ACT (FIFRA) - 1949: (substantially amended in 1972 and 1978) Not until the amendment of 1972 was the FIFRA perceived as a major source of environmental policy. FIFRA's purpose is to ensure that society reaps the benefits of pesticide application, with minimum risk to the environment and human health.

HAZARDOUS MATERIAL TRANSPORTATION ACT (HMTA) - 1957: HMTA is enforced by the US Department of Transportation and is intended to improve regulatory and enforcement activities by providing the Secretary of Transportation broad authority to set regulations applicable to all aspects concerning the transportation of hazardous materials.

TOXIC SUBSTANCES CONTROL ACT (TSCA) - 1976: This was an amendment to the Solid Waste Disposal Act (SWDA), and was subsequently amended in 1980 and 1984. It addresses the regulation of solid wastes (hazardous and nonhazardous) and, via the 1984 amendments, the regulation of underground storage tanks (UST).

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITIES ACT (CERCLA) - 1980: CERCLA is known as "Superfund."

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) - 1986: SARA was an amendment to CERCLA, and presented new and challenging requirements to EPA with respect to implementation and enforcement of reporting requirements, and under Title III, to industry in terms of compliance.

HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE (HAZWOPER) - 1980: It is designed to address qualification requirements and training for all personnel designated to handle or work with hazardous wastes during the normal course of work, and is enforced by the U.S. Department of Labor under OSHA.

POLLUTION PREVENTION ACT (PPA) - 1990: This legislation is designed to encourage industry to reduce the amount of hazardous waste generated during the manufacturing process. Several new provisions were contained that expanded the reporting requirements under SARA, Title III (Emergency Planning and Community Right-to-Know Act of 1986).

ADDITIONAL INFORMATION:

Until the 1950's the Rivers and Harbors Act was the only significant piece of legislation that addressed environmental pollution although the effect was indirect.

During the period of 1950 to 1970, air pollution was the primary focus of environmental policy development.

The Environmental Protection Agency (EPA) was created as an independent agency of the US government via an Executive Order entitled, "Reorganization Plan of 1970." The creation of EPA was accomplished by the Executive Branch of government instead of the legislative and thus is the exception to the normal process.

Other agencies of the federal government that are involved in national environmental policy formation include the US Department of Labor (DOL), the US Department of Transportation

(DOT), the US Department of Energy (DOE), and the Occupational Safety and Health Administration (OSHA).

The Federal Administrative Procedures Act (APC) provides the rule-making framework that is generally applicable to all federal agencies. This includes two primary methods for rule making: formal and informal. Formal rule making, seldom practiced, is to be performed only if it is specifically required by Congress in the originating statute. Informal rule making, also known as "notice and comment," is the method primarily used. This method is initiated with the publication of a "general notice of proposed rule making" in the Federal Register, which is meant to provide interested parties an opportunity to participate in the process and to satisfy due process requirements. "Hybrid rule making" involves a mixture of both formal and informal rule making and applies directly to EPA.

The states have similar, if not exact, requirements that are implemented and enforced on the state level under authorization from the EPA, aside from the federal process of environmental regulation.

The "environmental audit" is an established method of verifying that compliance with certain regulatory requirements and company policies are fulfilled; it ensures that acceptable operating practices are in place, and is routinely applied to situations ranging in scope from a formal regulatory compliance review to the use of self-help questionnaires and surveys. Types of environmental audits include: the "environmental compliance audit," typically conducted to evaluate the adequacy of a facility's compliance with a particular set of regulations and to verify that appropriate compliance systems are in place and functioning properly; the "environmental liability audit" or "risk assessment audit," typically performed on an existing facility in an attempt to determine the particular level of liability and/or potential liabilities associated with the facility's current environmental status; a "waste disposal site audit," and a "consent audit," performed as a remedy for previously identified problem areas, and generally used as a result of some settlement negotiations or consent decree imposed by an environmental authority.

PERMITS NECESSARY FOR LANDFILLS IN CALIFORNIA

Local

Local Planning Departments

Operating Permits; different names for the same permit include:

- Land Use Permit
- Conditional Use Permit
- Building Permit
- Planned Development Permit

Regional

Regional Water Quality Control Board

- Industrial Storm Water Permit
- Waste Discharge Requirements (WDR)

Contaminated Soils--Special Wastes Permit

Bay Area Air Quality Management District

Dust

Engine emissions from stationary power generation engines

State

California Environmental Protection Agency

Department of Toxic Substance Control (DTSC)

Hazardous Waste Facility Permits

On-site treatment, storage or disposal of certain kinds of waste streams

Limited by volume, concentrations, etc.

Subtitle D, RCRA from EPA

Federal

U.S. Army Corps of Engineers

Wildlife Refuge, 404 Permits, Section 10 or 7

TECHNOLOGY CERTIFICATION IN CALIFORNIA

On January 3, 1993, Governor Wilson issued a joint mandate for creating the California Environmental Technology Partnership (CETP) to the California Environmental Protection Agency (Cal-EPA) and the Trade and Commerce Agency. The mission of this group is stated in Cal-EPA's Hazardous Waste Environmental Technologies Fact Sheet (October 1994) as one which is designed to:

"preserve and promote California's high environmental standards to pursue pollution prevention, and to recognize, assist and promote California-based companies that research, develop, produce, market and export environmental technologies, goods and services."

With the passage of AB 2060, Cal-EPA's Department of Toxic Substances Control (DTSC) has been authorized to establish a Technology Certification Program to meet the challenges posed by this mission. The Technology Certification Program was instituted by DTSC in January, 1994 and seven environmental technologies have been certified to date. The two technology certification types currently available include: Regulatory Certification and Performance Certification. Regulatory Certification allows for certification of suitability for Conditional Exemption, Conditional Authorization and Certification Under Permit-by-Rule for hazardous waste treatment technologies. Performance Certification allows for state evaluation and certification of the efficacy and efficiency of a technology's performance.

Although not a regulatory requirement, Technology Certification is one of the options currently available to technology companies who wish to add credibility to the pollution prevention capabilities of their product. Blue teams will be given the option of choosing Technology Certification as one of several regulatory authorization options.

APPENDIX L: GLOSSARY OF TERMS

ARPA	Advanced Research Project Agency
ATP	Advanced Technology Program
BABCO	Bay Area Battery Company; Blue Team 2
BACT	Best Available Control Technology
BAD	Biologically Accelerated Decomposition - a patented process for rapid conversion of waste to harmless byproducts
CARB	California Air Resources Board
CFCs	Chlorofluorocarbons
CRADA	Cooperative Research and Development Agreement
CAST	Citizens Against Suspicious Technologies
CEJ	Californians for Environmental Justice
CUTS	Clean Up The Soil; Blue Team 4; a partnership between Behemoth Engine Co. and Electra Technologies
DOC	Department of Commerce
DoD	Department of Defense
DOE	Department of Energy
DTSC	Department of Toxic Substances Control
EPA	Environmental Protection Agency
ET	Electra Technologies
GMC	Gary Motors Corporation
LCA	Life Cycle Assessment
leachate	A solution resulting from dissolving soluble constituents from soil, landfill, etc. by downward percolating ground water.
NSF	National Science Foundation
putrescibles	Organic materials in a state of decay (like rotten banana peels)
RCRA	Resource Conservation and Recovery Act (1976)
R&D	Research and Development
Restore	Modern landfill company; Blue Team 1
ROCAR	Remove Organic Compounds At Refineries; Blue Team 3; a joint venture between Big Oil Co. and Clohi
SBIR	Small Business Innovation Research
SVOC	Semi-Volatile Organic Compound
STTR	Small Business Technology Transfer
TCE	Trichloroethylene
TRP	ARPA Technology Reinvestment Project
USABC	United States Advanced Battery Consortium
VOC	Volatile Organic Compound

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