Online Ethics Center
FOR ENGINEERING AND SCIENCE

L'Acide Case Scenario 3: Environmental Advocate

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Description

This case includes the point of view of Team 3, the environmental advocacy group, for the L'Acide cleanup case. This case includes handouts for 4 teams, each with hidden agendas, to be used in class discussion.

Body

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The City of L'Acide is located on the Gulf Coast of the U.S. with a population of 20,000. The main industry is the assembly of semiconductors (employment = 1523). The second largest industry, a battery manufacturer, closed last year, with an attendant layoff of 800 people. The City has two elementary schools and one middle school. Most high school students attend Bezique High School, which is 8 miles away.

You are a member of the environmental group, Eco Illumination (EI). EI has two major concerns recently. First, toxic substances have been found in the soil and ground water near the site of an old firing range, which may be contaminating the City's water supplies. Second, the proposed addition of genetically modified organisms into the City's soil and aquifer, as well as planted materials, could adversely impact the City's ecological diversity (e.g. invasion of genetically modified

organisms – so called GMOs -- into surrounding wetlands and woodlands).

The City has contracted with the engineering firm, Benebaction, Inc., to remediate a 3 hectare hazardous waste site from an old firing range that was deeded to the City by the military shortly after the Korean War. Part of the deed transfer included the stipulation that the transfer was “as is.” Bezique Creek runs through town and is about 200 m downstream from the site. The average water table depth is 3 m. In the 1990’s a local college conducted soil and water sampling and found “traces” of trinitrotoluene (TNT).

The site is a *brownfield,* i.e. the City has already retained an architectural firm to design a combined residential and commercial center, including an elementary school, on the site. Benebaction has been asked to study the hazardous compounds found in the soil and ground water at the site and find the best way to render them nontoxic. The company’s feasibility study (attached) includes probes from 10 monitoring wells that indicate that TNT concentrations range from “not detected” to 100 ppm. TNT ultimate degradation rates of these concentrations vary by the type of engineering controls being used. To reach ultimate destruction of the TNT, the company has provided the following estimates:

Natural attenuation: 15 years. (plume will reach drinking water well within 3 years).
Bioaugmentation alone: 7 years.
Pump and treat: 2 years. Will likely release VOCs without additional treatment.
Biostimulation and bioaugmentation: 1 year.
Biostimulation with genetically modified (GM) bacteria, with bioaugmentation: 3 months.
Above, with phytoremediation: 2.5 months.
Above, with GM plants: 1.5 months.

You are concerned about the numerous uses of genetically altered species. Benebaction is known to use genetically modified organisms based on their belief that they can enhance the rates of growth and metabolism for microbes, as well as that of larger organisms, in order to rapidly degrade recalcitrant pollutants in soil and ground water. This may be true, but you have concerns about the specific strain of bacteria being recommended, a type of *Pseudomonas etemu* which has been investigated only in the laboratory, although it does seem to degrade nitrogenous compounds rapidly.

In your mind, neither the human health nor the ecosystem risks has been fully evaluated. For example, the strain to be used here (Booboom A) is genetically modified (plasmid insertion) to use N-compounds as their food source. There are many N-compounds in the environment, so how does this organism stop with TNT? Are there other traits besides this that may have been transferred during the rDNA insertion? If so, how might these affect human allergenicity and ecosystem conditions?

Benebaction also recommends installing a white rot fungus (*Phanerochaete chryosporium*) bioreactor for all extracted materials (mainly soils) on site. The *P. chryosporium* will also be genetically enhanced, as will the sage grass to be planted around the site (to be weed resistant). How will this affect native grasses; is it possible that we will have “superweeds”?

You are aware that Benebaction is well-trained in presenting their points of view, and that have seen a fact sheet reminding their representatives how to address confrontations. You are not convinced that these environmental biotechnologies are different from food supply and agricultural biotechnologies that have been sternly criticized outside of the U.S. and about which you have read numerous critiques and editorials regarding their risks.

Your Charge

Discuss the pros and cons of this approach and your role as an environmental advocate in this case. Select a spokesperson from your group to represent you on today’s panel discussion at L’Acide’s town hall meeting on next steps.

Questions

1. What is your level of trust in the engineers in this case?
2. What do you believe is being held paramount in this project?
3. How can your views be expressed best?
4. What is the best way to ensure that the environment is being protected without introducing new problems, e.g. from GMOs?
5. What are the potential conflicts of interest in this case?

Rights

Use of Materials on the OEC

Resource Type

Case Study / Scenario

Topics

Safety
Public Health and Safety
Corporate Social Responsibility
Catastrophes, Hazards, Disasters
Environmental Justice

Discipline(s)

Engineering
Environmental Engineering