



The Environmental Challenge Program

...a competition for university students

THE PROBLEM – 2010

November 3-5, Missoula, MT

“Training Our Future Environmental Professionals”

The Purpose

The Environmental Challenge gives student teams the opportunity to develop solutions to a mock environmental problem and have the experience of presenting their solution to a panel of environmental professionals. We do not give you a lot of numbers to crunch. We are more interested to hear about the issues involved, how you interpreted the problem, how you got to your conclusions, and how well you can communicate your thoughts. We want you to have fun! This exercise gives everyone attending the conference a chance to participate and gets the professionals of tomorrow to interact with the professionals of today.

The Problem

Before coal was primarily used to generate electricity, as it is commonly used today, this particular fossil fuel was used to generate a crude low BTU value gas known as coal gas (also known as town gas or illumination gas). Central lighting in towns prior to the widespread use of electricity relied on coal gas as their street illumination. A central pipe system distributed the gas to street lights where they would be manually lit at dusk and then extinguished at dawn. The gas was generated by the pyrolyzation of coal, which produces numerous by-products, including: coke, coal tar, and sulfur to name a few. Early on in the history of coal gas use, many gas generators would simply bury the undesirable gooey by-products either on or near the generation site (an all too common practice of the past that we continually pay for in the present).

Missoula, Montana was a city proud to be one of the first in the West to boast city lighting through its very own coal gas production facility. Following the induction of the University of Montana in 1893, the coal gas system was thought to add punctuation of Missoula's emergence as the beacon of education for Montana. The facility was run by the Gassy Cowboy Luminance Co. (GCLC), a large player in the town gas business in Montana and Wyoming. Initially, like many other coal gas production facilities, there hadn't been an identified marketable uses for the generation process by-products and they was subsequently buried around the facility.

Back in 1948, the GCLC was bought out by Rocky Mountain Oyster Power (R-MOP), who's recent motto “We'll MOP up the competition to bring you cleaner more affordable energy.” Well as it turns out, the motto is becoming more costly than originally anticipated. As it happens, the land where the old coal gas generation site had been located was parceled off and is now the location of one of the most popular music stores in the area Rockin' Rutabaga's (R & R's). R &

R's proprietor, Neil Younger, was up to his usual new age marketing schemes when he had a well drilled on his property for his new "Fountain of Youth" section of in his store and didn't want to sully the new fountain with "processed and chlorinated city water." Half way through drilling the well, the drilling crew pulled up the bit and found it covered in thick, black, tarry goo. The sample was sent into the Department of Environmental Quality (DEQ) and determined to be waste from the old GCLC coal gas generation facility. Now R-MOP is potentially liable for the waste because they purchased GCLC.

For now, R-MOP has agreed to fund the remedial investigation for the site; however they are working very diligently to avoid sole financial ownership of any potential cleanup.

"We don't believe it's fair to our organization, nor to our customers, that we bear sole financial ownership of this problem. We purchased the Gassy Cowboy years after the mess was created, as well as the fact that we no longer even own the property in question anymore. If we are saddled with this enormous financial burden, it may just bankrupt us. Is this what we want for our community, what about the hundreds of jobs we provide to the community? The current owners and the state should help in this burden."

~Sparky Powers **R-MOP Representative**

R& R's has over the years become an icon in the area, and a community treasure. Community support of the music store is strong and the community has been following of this story in the local newspaper as well as weekly alternative publications.

"It's just like these big conglomerates with their deep pockets to put their hand out to us, the salt of the earth, just trying to spread peace and music into the world. This is going to hurt our business. We always offer a free organically grown rutabaga with every purchase over \$50. Now with this toxic ooze under our feet I don't even know if we can still call it organic. Missoula is a beautiful place with beautiful people, and we want this ugliness taken care of and we want it taken care of now!"

~Neil Younger **R & R's Proprietor**

The issue is becoming somewhat of a political talking point. It happens to be an election year and considering the city's growing environmental awareness and concern, politicians are quick to capitalize on the subject. Ever since the story came out people have come out of the woodwork with claims of respiratory problems, some near the site and some on the other side of town.

"I'm concerned about this coal gas waste site situation because I'm concerned about people. It's people, see, that makes America great, and I love America. What I hate is coal gas waste, because it hurts people, and America. If my constituents are getting sick then I'm going to help them, because that's what good Americans do, they help people, and I'm a good American"

~Jerry Mandering **City Council**

The DEQ's primary concern is that whoever holds the legal liability of the waste site, should clean-up the site according to the regulations. What they are interested in is viable solutions that are proven to work.

“We understand R-MOP’s concern, but we have a serious situation here. This site happens to be right on the bank of the Clark Fork River, which may be carrying this local problem well downstream. Whoever owns the liability must bear the burden.”

~Justin Time **DEQ’s Public Liaison**

R-MOP, in good faith, has commissioned a remedial investigation for the site in question, which is enclosed below. The energy company now must hire a consulting group to carry out a feasibility study based on the remedial investigation.

Your team might all be engineers and scientists in real life, but in this Problem you morph into whatever and whoever you think you need to “win” the competition. Also realize that the natural environment is not the only issue in this problem, the financial burden on a small energy company, small businesses making their way in a struggling economy, and health and safety are all a concern.

Your Assignment

In this problem your team represents a group of consultants who have been hired by the R-MOP to develop a feasibility study based on the findings of the remedial investigation. Your group must come up with viable alternatives to the outlined problem and ultimately give a recommendation for the most optimal solution. In your assessment you must consider environmental issues associated with the river and groundwater table and how this may affect local water quality, air quality, erosion, health and safety, wildlife, wetlands, and soil contamination. It is important to hear all stakeholders’ opinions and engage each representative. There is a lot at stake, businesses may be lost, fines could be levied, and elections could be lost.

As hired consultants, you must demonstrate an understanding of the process and provide solutions to any and all potential environmental and economic issues. Questions you must answer in addition to other pressing issues:

- What is the best way to reclaim or restore the waste site?
- What regulations need to be addressed to reclaim or restore the site?
- Are the current health concerns of the citizens valid? How will you educate them on your findings?
- How can R-MOP lessen its financial burden?

Remember, this is a small town and these are small businesses in a turbulent economic time.

The Expectation

Numbers are not what is most important – logic train, process, conceptualizations, and creativity are the most important considerations for your **proposal** and **presentation** (described below) composition. As you may notice, and as we have intended, you have been given more information than you may need to solve this problem. Yet keep in mind that this is a competition and every team may use the given information differently. Just remember the fundamental principle for success on any project KISS (keep it simple stupid). You will be expected to

present your thoughts in a public forum. Remember you can come up with assumptions, but they will need to pass the “straight-face” test. This is like the real world!

The Proposal (submit Monday November 1st by 4:00 PM, 2010 (before conference via e-mail: sdent@wsu.edu)

The proposal should outline the team members by name and the role they will have in the project (ie “Nilly Willy” is going to be engineer and will address waste issues, “Jim Beam” is going to be your air expert, “Justin Timberlake” is going to be our ‘architect’, and “Martha Stewart” is going to be your shaman etc, - you put in the disciplines that you think you need). The proposal should also illustrate the technologies and strategies your team has identified along with a clear approach of how you will be implementing them. The proposal should be in summary form and limited to three pages (this does not include title page or diagrams). Each proposal will be judged and given points as a factor in the competition.

The Tweak

No matter how much you do and know, in real life unexpected events and expectations can and do occur. To this end, you should expect (when you pick up your registration package) some late breaking information that might alter your approach and/or require your plan to evolve. The problem and the tweak will require that you find and talk to “experts” and attend various functions during the conference, for answers and important information (details on where you need to be to interact with key players will be provided on the first day of the conference). Remember, those who are most successful in the “real world” are those that can identify what resources they have and use them. You are at a professional conference, what resources do you have?

The Presentation

Your team will need to demonstrate your understanding of the issues that you addressed in your proposal. You must include not only your key elements from your proposal, but also demonstrate your adaptive management in dealing with the “Tweak.” Sustainable approaches for these and other site issues are of great interest to the owners. The winning team presentation will be strong in approach, logic, clarity, application, and creativity.

Each team will present their problem solution on Thursday morning the 4th of November as part of the technical session program that day. When we know how many schools will be presenting we will develop a schedule, but plan on presentations beginning at 8:30 AM and conclude an hour before the Awards Luncheon. PNWIS will have a projector and a laptop (w/Microsoft Power Point). Please bring a data stick or disk burner so we transfer your presentation to the laptop. **Plan for on no more than 15-minute presentation followed by 5 minutes of questions and answers.**

Attachments

Remedial Investigation:

Introduction

This report constitutes the remedial investigation (RI) for the Rockin' Rutabagas' Site (Site). The intent of the RI is to define the nature and extent of contamination at the Site and provide the basis for a feasibility study (FS). From which the cleanup action alternatives are evaluated.

Site Description and Background:

Site Description

The site is located at (address in Missoula), the former site of Gassy Cowboy Luminance Co. (GCLC). Several monitoring wells installed during the investigation are located on the (location) side of the Clarkfork River.

R & R's currently operates a music shop on the site with an active organic rutabaga garden. Property in the vicinity are zoned light industrial.

Site History

Between approximately 1887 and 1945, manufactured coal gas and carbureted water gas was produced on the GCLC property. In 1945, the Rocky Mountain Oyster Power (R-MOP) company purchased GCLC and all its holdings. In 1950 coal gas production was halted as a result of the new availability of cheaper and cleaner natural gas. The facility was subsequently demolished. Mr. Younger established R & R's on the Site, leasing the SGP property from R-MOP from 1965 until 1980, when he purchased the property outright.

Site Investigation Background

In 1993, the High in the Saddle Consulting Group, on the behalf of the Environmental Protection Agency (EPA) completed a screening investigation of the Site. The screening site investigation included sampling water and sediments of the Clark Fork River. The EPA's conclusion was that the samples did not appear to reflect a release of contamination from the site to the Clark Fork River and referred the matter to the Montana Department of Environmental Quality (DEQ) for further consideration.

In 1997, Mr. Younger had a well installed in the middle of the property for fresh water delivery to his R & R business. Oily material was observed at depth during drilling. This was brought to R-MOP's attention later that year.

An initial investigation conducted using a series of exploratory wells indicated the presence of affected soil at the Site containing total petroleum hydrocarbons (TPH), polynuclear aromatic hydrocarbons (PAHs), semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), metals, and cyanide well above detection limits within the oily deposit. Results from groundwater samples from the nearest drinking water supply wells did not indicate the presence of TPH, PAHs, SVOCs, or cyanide above detectable limits.

The Montana State Department of Health (DOH) performed a public health assessment on the Site in 1998. Their assessment concluded that there were no immediate public health concerns with current groundwater and land use. However, they determined further study would be warranted if the groundwater or land use were to change.

Summary of Site Conditions

The present understanding of the geology and hydrogeology, and nature and extent of contamination for soil, groundwater, sediment, and surface water at the Site is based on multiple investigations conducted by the EPA, DEQ, and R-MOP. Conclusions based on this analysis presented here are divided into two subdivisions: 1) geologic and hydrogeologic conditions; and 2) Site environmental conditions.

Geology and Hydrogeology

- Geologic units include from youngest to oldest, recent surficial fill materials, unconsolidated, sediment, and basalt bedrock.
- Fill materials as much as 30 feet in thickness adjacent to the river and 10 feet on the east end of the Site.
- Unconsolidated sediment consists of silt, sand, gravel, and cobbles approximately 120 feet thick.
- Groundwater level fluctuates between 10 and 20 between dry and wet seasons.
- Clark Fork River is higher in elevation than the groundwater, and is classified as a losing reach of the river.
- During most of the year shallow groundwater gradients are from the river to the fill, and from the fill laterally and downward to the native sand and gravel due to the fill much higher hydraulic conductivity.
- Hydraulic gradients in the site are very low and carry east from the river.

Environmental Conditions

- Constituents typically associated with manufactured gas plant processes were detected in Site soil samples at depths up to 80 feet below ground surface. Soils within the site are heavily impacted with SVOCs, PAHs, VOCs, and inorganic compounds.
- Constituents associated with the manufactured gas plant consists of a volume approximately 100,000 cu yds.
- Constituents associated with the manufactured gas plant were not detected in soil off site.
- Few VOCs, SVOCs, PAHs and inorganic constituents were detected in the groundwater samples analyzed, and those that were detected were not detected consistently.
- Analysis of the aerobic biodegradation and oxidation state of the site indicated a rapid decrease in carbon dioxide, sulfate, and methane concentrations, and increase in nitrogen concentrations, with distance from the site.
- No indicator constituents above mandatory cleanup levels were detected in sediment or surface water.
- Two wells were installed within the NAPL affected soil region of the site. NAPL free product, however, did not migrate into the wells indicating NAPL migration is apparently extremely retarded.

Site Map:

