



## **Considering Case Studies of Chemical Contamination**

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by Jeff Davis

### **Introduction**

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I am concerned about harmful chemicals being released to the world, whether it happens through carelessness or maliciousness, or whether it is unpredictable or unavoidable. My students are only ten or eleven years old and I am concerned that anger and blame will cloud reason and action. Through this unit, I am going to teach my fifth graders to examine situations of ominous consequence, rationally and sensitively so they can be citizens of positive action, not passive observers.

We will consider a collection of case studies including the Exxon Valdez disaster, the aftermath of Hurricane Katrina, the W.R. Grace and Beatrice Foods case from Woburn, Massachusetts, and the plutonium contamination in the South Fork of Acid Canyon in Los Alamos, New Mexico. In addition to these occurrences, the students will critically consider the current situation in the Galisteo Basin. This is where community activists are hindering Tecton Energy in its efforts to start drilling for oil in Santa Fe County. While studying these cases, the students will learn about the physical states of matter in the context of energy production (fossil fuels and plutonium). They will also scrutinize some shorter cases in small groups as they learn to develop rational points of view and cogent arguments in support of their positions.

### **Overview**

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My unit will address certain parts of the fifth grade state science and social studies standards for New Mexico. They will understand science standards concerning the physical states of matter - gas, liquid, solid, and colloid and sources of water, and they will learn social studies standards concerning civics, economics, and history. <sup>1</sup> I will teach them in the context of energy sources found in New Mexico. But this unit is much more than that. While learning about the states of matter, my students will learn how mineral rights give their owners the right to the minerals under ground but not the surface. Surface rights only give the owner the right to develop the surface. <sup>2</sup> They will learn how communities' work within a system to express opinions, persuade opponents, advocate positions, and make things happen. They will increase their skill set for asking good questions, making rational arguments, and recognizing alternative perspectives.

They will experience our political process and see how a community fights to preserve what they consider the "right" way to manage Santa Fe County while others argue for legal rights to make changes. In the case we consider in this unit, we will see how some groups are for drilling and some are against it. Some groups fear possible side effects to their quality of life if the oil company drills. In particular, they fear noise pollution, visual blight, and contaminated water supplies. Some believe the community will not realize any benefits. Those people do not think the recovered oil or gas will improve their life enough to take the risk. Another set of people think that getting the oil *will* improve their life. Some of them think it is hypocritical to complain about the cost of fuel and expect other communities to suffer those inconveniences for you. Some groups see a substantial profits in their future and believe the down side risk is well worth the chance. Some think it will make the country more secure. There are "pro" drilling people and "con" drilling people. The two sides are convinced that they are right and will do battle in the civil court and the court of public opinion - trying to win. Whichever side wins will use their win to influence political leaders in the county. They will use their influence to advocate for their position - stop the oil drilling efforts or stop the activists from disrupting the mining.

While the students follow this conflict's evolution, from initiation to resolution, they will learn how different states of matter interact in different conditions (e.g., heat and pressure) and how different circumstances affect the water table and aquifer behavior. (e.g., geology, mining).

Part of this growth in understanding will include learning how to analyze multiple sides of controversy and conflict. The students will gain that understanding by looking at and examining specially selected case studies with an eye toward fairness and justice.

One aspect of the Galisteo Basin case that is especially notable to my students is that the government, who will ultimately make the final call on the controversy, has a history of secrecy in the region (two nuclear labs) and of proceeding without the best interest of the local citizenry as a primary motivation (Manhattan Project). This reality will bring us to examine the history of the Los Alamos National Lab (LANL) and look briefly into the conduct of the nuclear industry. While studying the aftermath of Hurricane Katrina, the students will make decisions about who pays when nature has a hand in a disaster.

When the unit is finished, the students will know more about the states of matter than how liquids and gases will take the shape of their containers and how water can change between three states within 100 degrees Celsius. My students will understand something about how substances change, move, and interact with each other (e.g., liquids eroding or building, changes from heat or pressure). Depending on the nature of those interactions, otherwise benign substances can have a serious impact the community. In one of the situations we are considering, that impact has created heated debate in the local community. Through this study, students will learn how to form defensible positions on social controversy.

## Rationale

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Since the substances that we are going to consider in our study provide energy, primarily from fossil fuels, the lessons will address much more than gas, liquid, solid, and colloid. While observing the nature of gas, oil, coal, and uranium, my students will learn, through context, about mining, climate change, radiation, hazardous wastes, nuclear power, political power, certain aspects of how government, major industry, and the military function. They will see how socio-economic status mitigates power. And my students will learn how "regular"

people like them can make a difference in their community. I want my students to have a successful experience expressing themselves, convincingly and publicly. I want them to develop their voices, articulate their opinion, and then defend it with confidence.

My school is located just south of Santa Fe, New Mexico, about five miles south of the city line in Santa Fe County. Approximately 70 percent of the student population is on free or reduced lunch and a similar ratio is Hispanic with more than one-half of those having close ties to Mexico (e.g., grandparents, aunts and uncles, brothers and sisters, etc). They are mostly legal immigrant families, but many of them know undocumented people. There is no assumption that their friends and family will not be hassled by the authorities. They tend to mind their own business, keep quiet, and try to stay out of trouble. This is good in some ways but it also inhibits healthy risk taking and questioning of authority. This aspect of my school's population inspires me to look into those standards I am responsible to teach and to include critical and creative thinking skills and experiences in my lessons. I want my students to understand the political system they live in and to have the confidence in themselves to function actively in that system. While my generation is grumbling about the price of gas and war in the Middle East, I foresee even higher gas prices and increasing international and ethnic violence in my students' future. I hope to help them realize that they can influence their future and the future of their country. I have no business complaining. While I might wonder if I can afford a first class vacation next year, they might be the first class that can't afford any.

## Strategy

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The strategy I will use to implement this unit includes guest speakers, field trips, debates, models, textbooks, professional journals, newspapers, research activities, presentations and case studies. In addition to learning about properties of matter and how they behave and impact a community, the students will learn how to analyze situational models and communicate their positions concerning controversial topics. In addition, they will analyze and discuss the responsibilities public and private entities have for the communities with whom they are associated. The organization of these stages is designed to increase the students' background knowledge and build emotional buy-in in.

In Stage III, the students will use their increased knowledge and emotional experience to foreshadow the parts where we discover the behavior of ground water using the aquifer model. Background knowledge increases during analyses in the form of case studies.

The case studies will progress from brief and simple to complex and challenging. The content of the cases will develop from more concise, less ambiguous, professionally written case studies to more complex, real-life contemporary cases, with the last case taking place, during the teaching of this unit. <sup>3</sup> The field trip in the middle of the unit will give the students more concrete experiences in support of the conceptual learning through the case studies. The debates will help teach articulation and persuasion in preparation for the last case.

### Stage One

We will start this unit by providing some data on substances/chemicals that have been released accidentally or indifferently discharged and the consequences of the release. <sup>4</sup> After looking at the facts, we will consider

culpability and consequence - whether the action was criminal behavior or a civil offence and what an appropriate response is proportionate to the offensive actions. This will give an idea of the scope and scale of the problems these situations can cause. This is also the part of the unit where the teacher will present oral cases as found in the "Background" section of this curriculum unit.

## **Stage Two**

After the introduction with the data mentioned above, I will show a movie, *Civil Action*<sup>5</sup> in segments, with discussion at critical points. I will give students a study guide <sup>6</sup> for each segment and prepare them for some of the nuance the film offers. Viewing this film will give the students a chance to analyze and discuss different points of view and the process of dealing with the legal system in the context of hazardous waste management. I will ask key questions, leading students to think about ethics and responsibility.

## **Stage Three**

Next, we will use a water table / aquifer model to learn about how substances can and do migrate through the water. The New Mexico Environmental Department has a model that schools can use to teach about the ground water and aquifers in New Mexico. Using the model, students will experience a hands-on activity where they will see foreign substances move through the water table. They will see how excessive pumping can change the water table and alter the aquifer.

## **Stage Four**

After that, we will start our case studies. <sup>7</sup> The first one will commence with the whole class reading the case together. Depending on which case I pick, I will frame some open-ended questions, <sup>8</sup> leading to higher-level discussion.

The next case will start off the same way, except after reading the case together and my asking a few questions, I will put the students into groups where they will continue the discussion, using questions I provide to study the case before returning to the entire class for share and review.

Another case about disaster reparations <sup>9</sup> will follow with a similar process - i.e., we will read it together and I will provide the questions before the groups return to share.

Students will read the fourth case in their smaller groups first. I will give the students study guides <sup>8</sup> for the questions and they will have the discussion alone - but they can ask me questions if they are unsure how to do this alone. After some time, they will reconvene as a whole class and discuss.

The fifth and last case for this part of the unit will be the Vieques story/s. The case will be modified from cases as written by Dr. John Wargo <sup>10</sup> The class will read selected parts together. Separate groups will read and discuss separate parts using study guides <sup>8</sup> before coming together for final discussion.

The cases will be chosen and the questions designed to provide a platform for a critical thinking experience through which my students will gain understanding about ethics and rationality. By going through these exercises, they will learn how to get informed about the seemingly endless controversies permeating our lives and subsequently join the conversation.

## **Stage Five**

After working on the case studies, we will take a field trip to Bradbury Museum in Los Alamos. There we will explore the history of Los Alamos, a section on weapons and radiation, and a unit for students to work on projects (hands on). This field trip will take the better part of a day and I will turn over control to the very competent hands of the education department of the Bradbury Museum.

The Bradbury field trip will be followed with a case study on Acid Canyon in Los Alamos. <sup>11</sup> In addition to the case identified in note 10, there are sources for related information in the "resources for students and teachers" section of the end notes.

## **Stage Six**

After we do our series of case studies and do our Los Alamos visit and activities, we will host a debate between someone from the public relations / public outreach department of LANL and someone from Concerned Citizens for Nuclear Safety. Prior to this activity, students will be prepped on debate protocol <sup>12</sup> so they can observe the debate from a more informed perspective.

## **Stage Seven**

In next part of the unit the students will study the Galisteo Basin case. In this part, we will not use a formal case study - rather, we will read a series of articles (local newspapers, partisan websites, and informative information concerning this and similar situations). <sup>13</sup> Students will use their experience with case analysis to analyze and discuss the information in the context of our Santa Fe County controversy.

Our class will host a debate between Tecton and Drill Santa Fe (or at least advocates for their respective positions). Students will take notes and ask questions after the debate. After the debate, I will assign students a debate topic. They will work in teams to prepare for a classroom debate. They will have to demonstrate familiarity with their topic and be able to communicate clearly. Teams will be able to assign roles to their members so that a student who is unable to give a speech, for example, can make a valuable contribution and participate in the presentation. The debate topics will come from topics similar to the cases we studied.

Through the course of this unit, students will stop from time to time and consider the main learning points of their work. They will, along with me, decide what the most important parts of the learning are and create a series of quizzes. These quizzes will count toward their grades. They will also be scored by their work with the debate team.

A final report/presentation based on their choice of topic (most likely a follow up study on one of the model background cases) will also count toward their final unit grade.

## **Background**

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### **Exxon Valdez**

In 1989, the Exxon Valdez left the oil port in Valdez, Alaska. She was carrying over 53 million gallons of crude

oil towards Los Angeles, CA. An expert harbor pilot guided the ship through the Valdez Narrows before letting the captain, Joseph Hazelwood, take control once out into the regular shipping lanes. The captain steered out of the normal shipping lanes in order to avoid icebergs. Approximately two hours after leaving Valdez, Captain Hazelwood retired to his stateroom, leaving instructions with the third mate, who was driving, to return to the regular shipping lanes at a certain point. About an hour later, just after midnight, the ship ran into a reef that cut a hole in her side releasing nearly 11 million gallons of thick crude oil into the beautiful, pristine Prince William Sound. The only access to the sound is by air or boat, so clean up was problematic. Before the oil stopped spilling, 11,000 square miles of ocean were covered in oil and thousands of animals were killed. As many as half a million sea birds died, at least 1,000 sea otters, hundreds of harbor seals, hundreds of bald eagles, and billions of salmon and herring eggs were destroyed.

Some guiding questions when analyzing this case include, was Captain Hazelwood under the influence of alcohol? Was he at fault for the Exxon Valdez disaster? Was the event malicious or merely negligent, or perhaps neither? Who should pay and how much? Why didn't Able Seaman, Robert Kagan steer the Exxon Valdez back into the shipping lane as instructed? Why didn't Captain Hazelwood make sure there was someone on duty to watch where they were going?

The cause of the incident was investigated by the National Transportation Safety Board, which identified the four following factors as contributing to the grounding of the vessel:

- The third mate failed to properly maneuver the vessel, possibly due to fatigue and excessive workload.
- The master failed to provide navigation watch, possibly due to impairment under the influence of alcohol.
- Exxon Shipping Company failed to supervise the master and provide a rested and sufficient crew for the *Exxon Valdez*.
- The United States Coast Guard failed to provide an effective vessel traffic system. <sup>14</sup>

The Board made a number of recommendations, such as changes to the work patterns of Exxon crew in order to address the causes of the accident

Exxon was fined five billion dollars in punitive damages. An appeal reduced the award to four billion dollars, even though the judge thought five was fair. When Exxon appealed again, the judge raised it to \$ 4.5 billion (plus interest), perhaps for their arrogance. Eventually, the fine rested at \$ 2.5 billion dollars. Exxon appealed to the U.S. Supreme Court and in June 2008, the Court vacated the \$ 2.5 billion award and sent the case back to a lower court, finding the damages were excessive and that Exxon's actions were "worse than negligent but less than malicious." <sup>15</sup> Ultimately, the damages were set at \$ 507.5 million dollars, approximately 1/10 of the original judgment.

The spill from the Exxon Valdez is the biggest spill in US territory. The nature of the Prince William Sound, with its protected coves, exposed shores, and the diverse shore lines including sheer cliffs and rocky beaches with boulder sized rocks all the way to coarse sandy gravel made clean up complex. Cleaning the damage caused by the spill was difficult due to the physical conditions and was made worse because nobody had been confronted with these conditions before - some methods were being tried with no experience of success in those circumstances. "...An important observation that resulted from the Exxon Valdez oil spill was that natural cleaning processes, on both sheltered and exposed beaches, were in many cases very effective at degrading oil. It took longer for some sections of shoreline to recover from some of the invasive cleaning methods (hot water flushing in particular) than from the oiling itself." <sup>16</sup>

The cost of the Exxon Valdez disaster goes beyond the damage to the ship and the coastline. The captain and crew in charge paid in reputation, fines, and community service. Thousands of animals were killed or injured. And the cost of the clean up exceeded one billion dollars including losses associated with declining fishing industry and rehabilitation of oil soaked animals (each sea otter saved cost \$ 40,000). <sup>17</sup>

Since that incident, ships hauling oil have more stringent rules for staying off reefs and rocks. Double hulled ships are the norm. And the lessons learned by the clean up process make future disasters like the Exxon Valdez unlikely to reoccur.

## **Hurricane Katrina**

In 2005, Hurricane Katrina blew into Louisiana, Mississippi and Texas. There have been books, movies, and on going arguments assessing blame for parts of the human disaster and destruction of the natural environment. Those issues and controversies are well documented. In addition to the flooding, there were 595 oil and chemical spills caused by the storm. <sup>18</sup>

Some of those spills were unnoticed until much later. The hurricane uncovered an old oil spill near Galveston that stained Pelican Island Bridge. That spill came from "an old tank farm no one knew about." <sup>18</sup> What do we about that? Who is responsible for cleaning up that one? Other incidents caused by the hurricane include "harmful chemicals ... in the air in Mississippi - officials don't know the source." "[Some] of the 54 hazardous-waste sites in the storm's path show that in some cases the hurricane re-released long-buried pollution." A storage tank belonging to Cytec Industries was "leaking sulfuric acid at one-gallon every minute." The storm surge moved giant 193-foot diameter tanks more than 100 feet, 450,000 gallons of oil poured into the surrounding countryside. The tank's containment pond, meant to hold 130 percent of the tanks' contents was full of water. The companies that own the tanks believed the weight of the tank would hold them down, but the oil is lighter than water, and they move. In 1961, a tank in Hackberry, LA was floated more than six miles. Ivor van Heerden, the Director of the Louisiana State University Center for the Study of the Public Health Impacts of Hurricanes said in a 2003 report, "A high proportion of [the tanks] are not properly tied down." <sup>18</sup> Is it faulty equipment? Is it simply the cost of doing business on the gulf coast?

Who is responsible for the 595 leaks? Should the companies that owned the facilities that leaked take responsibility for being unprepared? What about the Army Corps of Engineers, who built the levees? Are they responsible? When it was suggested that the oil companies did not prepare enough for contingencies that *should* be prepared for in that region, spokesman Larry Wall, of the Louisiana Mid-Continent Oil and Gas Association, said, "We don't like to spill oil. Oil that spills is of no value." Does that suggest that Mr. Wall or the oil company only care about money, or does he simply recognize that is the reality of how they are perceived, so he responds in kind? Wall added, in discussing preparation for storms, "Nature can always topple you." <sup>18</sup>

Bill Hoagland, a senior advisor for Senator Frist, R-Tennessee, when questioned about the \$ 200 billion estimate <sup>19</sup> for Hurricane Katrina relief by the federal government, figured the amount to be closer to \$ 100 billion by adding some numbers. Maximum federal supplemental disaster assistance is \$ 26,200 per household. If 1.1 million households were affected, that's around \$ 30 billion. The "working assumption is that there are 400,000 who have lost their jobs and qualify for unemployment assistance. The average benefit is \$ 250 per week, which would be \$ 2.5 billion for six months. Food stamps would be another \$ 2.5 billion. The U.S. Department of Agriculture estimates farm-related losses to be \$ 1 billion. If you add Hoagland's estimate of \$ 30 billion for flood insurance claims (is this fed responsibility?) and \$ 2 billion in federal tax incentives; that adds up to almost \$ 70 billion. These numbers do not include "Federal property such as weather and

military stations and public infrastructure." The Federal government picks up 75% - 100% of rebuilding public infrastructure (roads and bridges). There was no number for that cited, but it is not likely to be \$ 200 billion. <sup>19</sup> Hoagland was concerned, in 2005 that the \$ 200 billion estimate "could become a self fulfilling prophecy"

Other states wonder why their disasters are not getting the same fiscal attention as from Katrina. <sup>20</sup> Finding the actual cost of Katrina to the fed is not easy but they certainly have costs beyond the money to rebuild infrastructure, provide unemployment benefits, and cover insurance payments. Families had to move, replace their belongings, rebuild their social lives, rebuild families, and reestablish their credit.

In addition to the actual costs of rebuilding, there are the undocumented costs of profiteers and sub sub sub contractors. The Washington Post's Joby Warrick found that there are at least three or four layers of subcontracting for cleaning up basic hurricane damage, like roof repairs and refuse disposal. These multi-layer subcontracting systems increase the cost to the taxpayer from the actual cost of the work from 40% to 1,700%. <sup>21</sup> This suggests that the costs of Hurricane Katrina are higher than the damage to the infrastructure and direct human misery. The expenses also include the unfair, increase in cost to the taxpayers.

The cost of Hurricane Katrina will not be known for a long time. Parts of New Orleans are still disaster areas. Trailers used to house residents temporarily are still inhabited - years beyond the recommended time. There are now concerns that the chemicals in the trailers, which were not designed for full-time residency, will cause serious health issues for the victims of the hurricane. Some of the failures of the levy system have been corrected, or at least addressed, but for the most part, there is little reason for the residents of New Orleans to have confidence if another hurricane like Katrina comes ashore.

## **Acid Canyon**

Between 1944 and 1964, the Los Alamos National Lab (LANL) disposed of water that was contaminated with plutonium and possibly other radioactive substances by pouring it into the south fork of Acid Canyon.

Acid Canyon, in Los Alamos NM was donated by LANL to the county of Los Alamos in 1967 to be used as the county wished. The county made it into a park with bridges and hiking trails for the citizens of Los Alamos to enjoy. The canyon is located between a skateboard park and the aquatic center - a public swimming pool. Thirty-two years later, in 1999, LANL found "hot spots" of plutonium in the canyon. The bridges and trails were closed. Later, in 2001, LANL commenced some cleanup endeavors. After eight years and \$ 1.2 million, parents are still telling their kids to stay away from Acid Canyon. <sup>22</sup>

Should LANL have been more concerned about hazardous substances under their care? Was the race to build the atomic bomb a legitimate reason to be lax in terms of "throwing out the trash?" (my quotes) Was fear of nuclear war with the Soviet Union an excuse for reckless behavior by the government? Was the relative isolation and remoteness of Los Alamos on the Pajarito Plateau grounds for careless conduct concerning the environment? Was it accidental or deliberate indifference?

Chemical and radioactive liquid wastes including solvents, metals, uranium, tritium, and between two and twelve grams of plutonium 239, and 240 <sup>23,24</sup> were discharged directly into a tributary drainage of Acid Canyon prior to 1951. <sup>24</sup> There is still some question about the canyon's condition today. Who is culpable and what is the extent of their responsibility?

According to Concerned Citizens for Nuclear Safety (CCNS), LANL measured 7,780 picoCuries/gram (pCi/g) of



plutonium, which they said was about 250 times the "safe" amount, 280 piC/g. LANL proposed to clean up the canyon to an average of 280 picoCuries. The canyon is about 1,000 feet long. The contamination is mostly limited to the lower 650 feet. Since LANL averaged the entire length *and* all the layers of the streambed cut, it is more than likely that the actual amount of picoCuries/gram of plutonium in the "hot" parts is higher. In addition, the 280 piC/g is 10 times higher than the level of clean up LANL does on LANL property (i.e., 25 piC/g). <sup>25</sup>

In Livermore, CA, the University of California, who also manages LANL, left another plutonium mess. In California, it is not legal for levels of plutonium to exceed 2.5 piC/g. Why is there such a difference in "acceptable" contamination between Livermore and Los Alamos? Some would say it is because there are more minorities within a 50-mile radius of Los Alamos, more than any other Department of Energy (DOE) site. Also, 15 percent of those people live below the poverty line. <sup>25</sup>

The Concerned Citizens for Nuclear Safety (CCNS) and Northern New Mexico Citizens Advisory Board made inquiries regarding these questions and LANL responded. The lab explained that the radioactive dose that children would receive if they were playing along the stream channel for one-hour a day for 200 days would be less than the limits established for members of the public under EPA guidelines. <sup>26</sup> In any case, the DOE's principle of ALARA (As Low As Reasonably Achievable) was implemented and in November, 2001, LANL brought in giant vacuum trucks and special containers. They used the vacuums to suck up nearly 400 cubic yards of contaminated soil. The vacuum machine included a method for collecting any dust generated by the operation and all the sediments and soils were taken to a special low-level radioactive waste disposal area. <sup>26</sup>

Parents still refuse to let their kids play in the county park at Acid Canyon, even though LANL says it's okay. There is a feeling that someone is working on it, or that LANL will do everything they can. <sup>22</sup> The vacuum clean up took less than a month to complete and cost \$ 1.2 million. Additional costs included analyzing the sediment of lakes in the area for contamination and radioactivity. <sup>26</sup>

## **Tecton Energy**

In February of 2008, executives of Tecton Energy, of Houston, TX announced they were considering suing Santa Fe County for stopping them from drilling exploratory wells in their efforts to find oil in the Galisteo Basin. <sup>27</sup>

Drilling Santa Fe (DSF) is a non-profit (501c3) organization created to protect the Galisteo Basin from exploitation by companies interested in oil exploration and extraction. DSF has an effective public relations arm that provides data, anecdotes, charts, graphs, and pictures <sup>28</sup> to support their case. They claim that Tecton Energy will render the Galisteo Basin ugly and dangerous, lead to diminishing land values, and destroy natural and cultural sites as well as religious and sacred sites. They argue that the water supply will be irreparably harmed, wild life habitat destroyed, and quality of life permanently damaged. <sup>29</sup>

Tecton says they are environmentally sensitive. <sup>30</sup> For example, they plan to drill responsibly using "closed loop" drilling practices. This is where the water and chemicals used to make the oil flow more easily is recovered and collected in tanks. <sup>31</sup> This process of using the fluids is called "fracking," and it is controversial. Simply put, fracking is when fluids are forced into cracks in the earth to make them wider so the oil will flow easier. <sup>32</sup> The EPA came to the conclusion that fracking "poses little or no threat" to drinking water. However, the Oil and Gas Accountability Project claims that fluids used [in fracking] are carcinogenic, that the original

EPA report was altered, and that an earlier draft "suggested unregulated fracturing poses a threat to human health [and] fracturing fluids may pose a threat to [the safety of] drinking water." <sup>33</sup> Tecton Energy's old website <sup>34</sup> states their commitment to being environmentally sensitive by using "available technology to insure safe and clean operations ... take care to not harm the air and water around us ... conduct activities quietly and discretely ... to not disturb wildlife." <sup>31</sup>

Not everyone is convinced that Tecton Energy will be a good steward. Phaedra Haywood, of the Santa Fe New Mexican, writes of fracking, "The specific ingredients in each company's frack fluids are deemed proprietary by the industry, meaning operators aren't required to disclose what is in them." People who live near wells where hydraulic fracturing has been performed have reported serious health problems they believe are tied to chemicals in fracking fluid." <sup>32</sup> Being from a desert environment, New Mexicans have long kept a close eye on water use. "By some accounts, it takes millions of gallons of water to drill [a well]. Tecton Energy president Bill Dirks estimated his company would likely use 40,000 to 75,000 gallons of water per well." <sup>32</sup> The number of wells Tecton would drill is unknown. The source of that water is also unknown.

One of the most contentious issues around oil well drilling concerns contaminated drinking water. Bob Gallagher, president of the New Mexico Oil and Gas Association, states, "Not a drop of water that's been delivered to a consumer (in New Mexico) has ever been contaminated by oil and gas activities." Yet Mark Fesmire, Director of New Mexico's Oil Conservation Division, and other state employees, point to 743 self-reported cases of groundwater contamination in the state. <sup>33</sup> A not uncommon perspective of oil wells is eloquently stated by Ted Falgout, a Port Director in Port Fourchon, LA, "It's OK to have an ugly spot in your backyard," Falgout says, "if that spot has oil coming out of it." <sup>35</sup>

The Tecton Energy saga is only just beginning.

## Notes and Resources - For Teacher

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1. State Standards addressed in the unit - see appendix A
2. This website has a very clear and easy to read explanation of property rights -
3. me history and the difference between mineral rights and surface rights. The
4. portant thing is that you have to pay attention to deeds and contracts when buying real estate.
5. [tp://geology.com/articles/mineral-rights.shtml](http://geology.com/articles/mineral-rights.shtml)
6. This case concerns the area near my school. This unit could be adjusted to
7. her areas that are experiencing dubious environmental concerns in their areas (e.g., Yucca Mountain in Nevada)
8. . Data listing Superfund sites nation wide including spills and releases -
9. uperfund sites listed by state with history and progress for each on this website
10. [ttp://www.epa.gov/superfund/sites/npl/npl.htm](http://www.epa.gov/superfund/sites/npl/npl.htm)
11. il Spills listed on page 5 of document at this website
12. [ttp://response.restoration.noaa.gov/book\\_shelf/26\\_spilldb.pdf](http://response.restoration.noaa.gov/book_shelf/26_spilldb.pdf)
13. . *Civil Action*. Director, Zaillian, Steven. A movie, starring John Travolta, Robert
14. val, and others, about a lawsuit concerning illegally dumped toxic chemicals that caused Leukemia in some citizens in Woburn, Massachusetts in the 1980s. This drama presents the process some citizens of

Woburn went through, along with the lawyers on both sides, in an attempt to reach justice. There are no violence, sex, or drug references. There are three instances where "fuck" is uttered. Those instances can easily be muted at 1:34, 36:58, and 59:36

15. . See appendix B for Civil Action study guide
16. . The Case Studies to use in this section of the unit can be found on this website -
17. <http://ethics.sandiego.edu/resources/cases/HomeOverview.asp>
18. The cases I am considering include numbers 28, 29, 37, 70, 83, 86, 94, and 98.
19. The case below is about different peoples' views on Ecotourism in Costa Rica.
20. <http://www.sciencecases.org/ecotourism/ecotourism.asp>
21. There are numerous case studies available and a teacher can use these or
22. find different ones that resonate with them.
23. . Possible question types and methods for case study discussions.
- 24.igsaw - students will work in small groups with each group taking a particular
25. perspective (be they individuals, coalitions, regions, partisans, etc.) to develop and advocate for.
26. Teacher leader - read this article on "What Not to do When Teaching Cases" by Clyde
27. Freeman Herreid, for tips and methodology (why reinvent the wheel?)  
<http://ublib.buffalo.edu/libraries/projects/cases/teaching/dont.html> See appendix C
28. . This case will be #94 from "ethics.sandiego.edu" website found in note #7
29. 0. The Vieques case was adapted from a case written by Dr. John Wargo with
30. permission
31. 1. An Acid Canyon case can be found at <http://lanl-the-rest-of-the-story.blogspot.com/2008/06/bomb-work-dumping-confirmed-by-raam.html>
32. This case was published on a blog and written by Raam Wong, who writes for the Albuquerque Journal. Additional information to consider can be found in the "resources for students and teachers section of these end notes under "*Acid Canyon*."
33. 2. This website has lessons, rules, handouts, and rubrics for teachers to teach
34. debating.
35. [http://www.kyrene.org/schools/brisas/sunda/debate/teaching\\_debate.htm](http://www.kyrene.org/schools/brisas/sunda/debate/teaching_debate.htm)
36. 3. For information on Tecton, the Galisteo Basin and the related controversies,
37. we will use links and articles from the Santa Fe New Mexican, the
38. Albuquerque Journal, and partisan web pages and blogs. See the "Resources
39. for students and teachers" for partial list.
40. 4. National transportation safety board report
41. [http://www.eoearth.org/article/Exxon\\_Valdez\\_oil\\_spill](http://www.eoearth.org/article/Exxon_Valdez_oil_spill)
42. This website refers to an often-cited list of causes that the National
43. Transportation Safety Board attributed to the Exxon Valdez disaster
44. Justice Souter of the Supreme Court, June 2008. An interesting site and good information, as cited in the California Appellate Law Blog
45. <http://www.caappellatelaw.com/2008/06/articles/another-category/supreme-court-splits-in-baker-v-exxon-shipment-decision/>
46. Oil Spill Case Histories (1967-1991) Summaries of Significant U.S. and International Spills. A list of 110 oil spills with detailed information on the nature of the spill and the clean up.
47. [http://response.restoration.noaa.gov/book\\_shelf/26\\_spilldb.pdf](http://response.restoration.noaa.gov/book_shelf/26_spilldb.pdf)
48. Another account of the Exxon Valdez disaster with more emphasis on the
49. facts. <http://www.boisestate.edu/history/ncasner/hy210/valdez.htm>
50. This article discusses the 595 spills of chemicals, oil, and other incidents

51. used by the two hurricanes that landed on the gulf coast in 2005. The quantity and damage has been likened to the Exxon Valdez disaster in 1989.
52. [tp://www.chron.com/disp/story.mpl/nation/3457319.html](http://www.chron.com/disp/story.mpl/nation/3457319.html)
53. Senator Gregg, R-N.H estimated 200 billion in damage as reported by San
54. Francisco Chronicle's Kathleen Pender, Sept. 27, 2005  
<http://www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/2005/09/27/BUGADEUO01.DTL>
55. 0. According to Judd Gregg, R-N.H., as cited in the USA Today,
56. [tp://www.usatoday.com/news/washington/2006-08-21-katrina-costs\\_x.htm](http://www.usatoday.com/news/washington/2006-08-21-katrina-costs_x.htm)
57. 1. Washington Post, March 20, 2006  
<http://www.washingtonpost.com/wp-dyn/content/article/2006/03/19/AR2006031901078.html>
58. 2. I heard parents discussing these things while at the Bradbury Museum in the
59. summer of 2008.
60. Los Alamos news and communications office - how much plutonium was
61. released in Acid Canyon
62. [tp://www.lanl.gov/news/index.php/fuseaction/home.story/story\\_id/1661](http://www.lanl.gov/news/index.php/fuseaction/home.story/story_id/1661)
63. 4. Information sheet: Acid Canyon ER 2001-2=1006
64. [tp://www.lanl.gov/environment/cleanup/docs/factsheets/fs\\_acid\\_canyon\\_er2001-1006.pdf](http://www.lanl.gov/environment/cleanup/docs/factsheets/fs_acid_canyon_er2001-1006.pdf) prepared by LANL environment department
65. 5. Concerned Citizens for Nuclear Safety (CCNS)
66. [tp://www.nuclearactive.org/docs/doublestandard.html](http://www.nuclearactive.org/docs/doublestandard.html)
67. CNS "double standard" LANL proceeding with Acid Canyon Plutonium Soil
68. cleanup at Level 10 Times Higher than Other LANL Cleanups
69. LANL News and public Affairs news releases, "Acid Canyon Cleanup Done
70. A Vacuum, LANL reports their side of the acid canyon situation
71. [tp://www.lanl.gov/news/releases/archive/01-091.shtml](http://www.lanl.gov/news/releases/archive/01-091.shtml)
72. 7. Santa Fe & Northern New Mexico - News, Phaedra Haywood reported Tecton
73. Energy's complaint regarding Santa Fe County's drilling ban. Follow up blog
74. is pretty emotional. Haywood, Phaedra. 2008. Tecton Decries Proposed
75. moratorium.
76. [tp://www.santafenewmexican.com/SantaFeNorthernNM/Tecton-decries-proposed-moratorium](http://www.santafenewmexican.com/SantaFeNorthernNM/Tecton-decries-proposed-moratorium)
77. accessed July 2008
78. Picture of area west of ABQ where Tecton Energy wants to explore for oil - a
79. good picture has Tecton well field in Farmington superimposed over the west-of-ABQ site.  
<http://www.drillingsantafe.info/atriscoflyercolor.pdf>
80. For more information on DSF, see their home page, <http://drillingsantafe.blogspot.com/>
81. report on the Galisteo Basin, prepared by the New Mexico Energy, Minerals,
82. and Natural Resources Department, a cabinet level executive agency
83. [tp://www.emnrd.state.nm.us/main/documents/Galisteo.Basin.Report.pdf](http://www.emnrd.state.nm.us/main/documents/Galisteo.Basin.Report.pdf)
84. This report basically supports contentions made by Drill Santa Fe
85. and this following web page is titled, Environmental Commitment and describes
86. Tecton Energy's philosophy (?) regarding the environment.
87. [tp://web.archive.org/web/20060825191549/www.tectonenergy.com/envirocomm.htm](http://web.archive.org/web/20060825191549/www.tectonenergy.com/envirocomm.htm)
88. This is an archived version of Tecton Energy's website. Recently, (mid-2008),
89. Tecton Energy changed their website to include ONLY contact information.
90. Does this suggest they are changing their image? Does one have to make
91. personal contact for information about Tecton Energy?

92. [tp://web.archive.org/web/20060825191435/www.tectonenergy.com/Default.htm](http://web.archive.org/web/20060825191435/www.tectonenergy.com/Default.htm)
93. 2. <http://www.earthworksaction.org/pubs/Fracking.pdf> including pictures and
94. diagrams Earthworks, an organization that claims commitment to "protecting
95. communities and the environment" has an informational sheet put out by their
96. Oil and Gas Accountability Project" on fracking pointing out that hazardous
97. substances such as biocides, diesel fuel, acids, metals, ethylene glycol,
98. corrosion inhibitors, and other chemicals are used in fracking.
99. This is a very informative article from the Santa Fe New Mexican about oil
100. drilling in general and in New Mexico specifically. It is specifically
101. concerning Tecton Energy and includes several quotes.
102. [tp://www.santafenewmexican.com/Local%20News/Drilling-s-hidden-costs](http://www.santafenewmexican.com/Local%20News/Drilling-s-hidden-costs)
103. 4. Tecton's website has recently dropped all the links and pages. The website is
104. currently limited to a page of phone and US Mail contact information.
105. 5. USA Today, 7/14 article about offshore drilling
106. [http://www.usatoday.com/money/industries/energy/2008-07-13-offshore-drilling\\_N.htm?loc=interstitialski](http://www.usatoday.com/money/industries/energy/2008-07-13-offshore-drilling_N.htm?loc=interstitialski)  
p

## Resources for students (research) and teachers

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### Exxon Valdez

Exxon Valdez Oil Spill Trustee Council (EVOSTC). Website with several pages including history, restoration projects, pictures, and news. Images are freely available with a request that the EVOSTC be credited

<http://www.evostc.state.ak.us/>

This page breaks down all civil and criminal settlements with Exxon

<http://www.evostc.state.ak.us/History/settlement.cfm>

Comprehensive account from the loading of Exxon Valdez to the grounding, including a recording of Captain Hazelwood's distress call

<http://www.evostc.state.ak.us/History/excerpt.cfm?part=-1>

### Acid Canyon

This is a report citing studies done by or on behalf of CCNS in 1999. The study is on the effects of the contamination of South Fork of Acid Canyon on the community. Very interesting - even though it is old. I am continuing to look for updated information.

<http://www.nuclearactive.org/docs/atsdr.html>

This article, from late 2001, explains the clean up of Acid Canyon, and is put out by LANL

<http://www.lanl.gov/news/releases/archive/01-091.shtml>

This is a report on the soil clean up in Acid Canyon, written in 2005.

<http://www.ieer.org/reports/lanl/cleanup.pdf>

This case was published on a blog and written by Raam Wong, who writes for the Albuquerque Journal. A woman claims the plutonium in Acid Canyon is responsible for her father's recent death.

<http://lanl-the-rest-of-the-story.blogspot.com/2008/06/bomb-work-dumping-confirmed-by-raam.html>

## **Tecton Energy**

This web page is from the Santa Fe New Mexican in January 2008. The point of the article, by Robin Martin, is to discuss the likelihood that the controversy is worth the fight - in terms of the potential for black gold in the Galisteo basin.

[http://www.santafenewmexican.com/Local%20News/Tapping\\_the\\_unknown\\_](http://www.santafenewmexican.com/Local%20News/Tapping_the_unknown_)

## **Pictures**

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### **Exxon Valdez**

"Boots"

[http://www.evostc.state.ak.us/Universal/Images/GalleryImages/spill/downloadable%20.jpgs/CLE\\_038.jpg](http://www.evostc.state.ak.us/Universal/Images/GalleryImages/spill/downloadable%20.jpgs/CLE_038.jpg)

"Boom"

[http://www.evostc.state.ak.us/Universal/Images/GalleryImages/spill/downloadable%20.jpgs/EVOSWEB\\_016\\_boom2.jpg](http://www.evostc.state.ak.us/Universal/Images/GalleryImages/spill/downloadable%20.jpgs/EVOSWEB_016_boom2.jpg)

"Slick"

[http://www.evostc.state.ak.us/Universal/Images/GalleryImages/spill/downloadable%20.jpgs/EVOSWEB\\_022\\_slick.jpg](http://www.evostc.state.ak.us/Universal/Images/GalleryImages/spill/downloadable%20.jpgs/EVOSWEB_022_slick.jpg)

"Oil/No oil border line"

[http://www.evostc.state.ak.us/Universal/Images/GalleryImages/spill/downloadable%20.jpgs/OIL\\_047.jpg](http://www.evostc.state.ak.us/Universal/Images/GalleryImages/spill/downloadable%20.jpgs/OIL_047.jpg)

"Oiled duck"

[http://www.evostc.state.ak.us/Universal/Images/GalleryImages/spill/downloadable%20.jpgs/EVOSWEB\\_010\\_oiled\\_duck.jpg](http://www.evostc.state.ak.us/Universal/Images/GalleryImages/spill/downloadable%20.jpgs/EVOSWEB_010_oiled_duck.jpg)

### **Hurricane Katrina**

<http://www.katrinaimages.com/>

## Acid Canyon

This is part of a collection of hiking trails

<http://networks.cs.ucdavis.edu/~amitabha/LosAlamosHiking/>

## Tecton Energy

The is a beautiful shot of the basin

<http://www.myfourthirds.com/document.php?id=12928>

Don't forget to use satellite photo images too.

## Resources - For Teacher

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### Cases

Other interesting cases for teacher background are found at this site -

<http://www.umich.edu/~snre492/cases.html>

especially, "The Siting of Beard Elementary School on Contaminated Soil"

Accessed July 2008

Oil Spill Case Histories (1967-1991) Summaries of Significant U.S. and International Spills. A list of 110 oil spills with detailed information on the nature of the spill and the clean up. [http://response.restoration.noaa.gov/book\\_shelf/26\\_spilldb.pdf](http://response.restoration.noaa.gov/book_shelf/26_spilldb.pdf)

Accessed July 2008

This website presents both sides of the Woburn, MA lawsuit dramatized in the film, *Civil Action*. The information is presented as evidence, allowing the reader to decide the case as if he or she were on a jury. An audio recording introduction of the site is included.

<http://www.elmhurst.edu/~chm/onlcourse/chm110/issues/issue6B98.html>

Accessed July 2008

A brief history of WR Grace Co in the Seattle PI

<http://seattlepi.nwsourc.com/uncivilaction/grac19.shtml>

Accessed July 2008

Tecton Decries Proposed Moratorium, written by Phaedra Haywood who writes for the Santa Fe New Mexican,

<http://rillingsantafe.blogspot.com/2008/02/tecton-energy-llc-threatens-to-sue.html>

Accessed July 2008

## Bibliography

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Kessler, David. *A Question of Intent*. New York: PublicAffairs, 2001

Wargo, John. *Our Children's Toxic Legacy*. New Haven: Yale University Press, 1996

Welsome, Eileen. *The Plutonium Files*. New York: Dial Press, 1999

## Appendix A

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Science Standards:

Strand 1, Standard I,

Benchmark 1, performance standards 1, 2, 3, 5

Benchmark 2, performance standards 1, 2

Strand 2, Standard I, Benchmark 1, performance standards 1, 2, 6

Standard III, Benchmark 2, performance standard 3

Strand 3, Standard I, Benchmark 1, performance standard 1

Social Studies Standards:

Strand 1, Benchmark 1-D,

Strand 2, Benchmark 2-C, D, E, F

Strand 3, Benchmark 3-A, D

Strand 4, Benchmark 4-A



## Appendix B

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Civil Action - study guide

Before watching discuss;

Plaintiff's Worth - what is a plaintiff?

Value of a person's future - earning potential

Plea bargaining - settlements vs. going to jury

Lawyers watch the jury to see how they are responding to the case

1:34, MUTE "shut the fuck up"

CLASS READ preview BEFORE VIEWING

Make these questions "fill out" QUESTIONS, include characters' name on question sheet

6:18 - on the radio show ... what is Jan thinking?

Why does he look at the ON-AIR sign?

7:10 - people in the office talk about the case for the first time.

How does each of the characters (Jan, James, Kevin, and Anne) feel about the case?

... What is their body language?

8:00 - What are their "takes" on the case ... why do they want to (or not) take the case?

9:00 - What does Jan's reaction to the cop tell you?

12:00 - Why is he looking at the little shack and the water, what is he thinking?

13:30 - What does the truck trailer say on it?

- What are the men hanging up, rolling in barrels, what is coming out of the pipe?

14:30 - what is the name of the food company that sells leather?

- Jan is naming a bunch of products ... what is the significance of those products?

15:00 - why is he all of a sudden interested in the case??

DISCUSS

Client - customer of the lawyer

Explain to students how a lawsuit is initiated, like a war -

Starts with complaint, the big boys intimidate the small boys,

But not this guy (remember how he got the hospital to go up to \$ 2 million?)

Deposition - what is it, how is it used as a tactic in the "war"

There are strategies -

You give them your complaint to let them know that you are coming.

If they are the big boys, they will either try to blow you off or just PAY you off.

If you won't settle for what they offer, you have to "fight" - but you have to convince a jury (or judge) that your case is real and that your opponent's position is unfair. OR

You convince the opponent that they will lose and they should give you what you want.

Mr. Facher and Mr. Doyle must be partners (explain)

15:30 - describe the declaration of war

17:00 - why is that guy working through his lunch.

- And why does Facher tell him to take a break. . Does he really want t him to?
- Does he really think it will be a good thing?
- What is he REALLY saying??

18:00 - the paper he is reading is a copy of the law suit, the headings are talking about things the company is being accused of.

Look at the view out his window -(it is his office) ... do you think that is a good office? Is this one of the big boys or a little boy? Is he confident or insecure? Why do you think?

What does bouncing the ball off the wall say about his feelings over the phone call?

18:40 - Bill Cheeseman, Who does he work for? Who is he representing?

19:15 - What is rule eleven?

19:40 - What does, "if you get a fine, pay it?" mean (hint, the "fine" is a metaphor)?

- What does, "if you knock a man down, do it so he does not get up again" mean?
- What do you think he is talking about ... who is getting knocked down?

20:00 - Jan is on TV, the reporter is asking him questions and he is answering like he is having a normal conversation ... whom do you think he is really talking to?

20:15 - What is his "look" supposed to convey, how about the sigh?

- His co-workers are answering the questions as they watch, are they really agreeing with him? Are they playing the role of the rest of the audience? Why are they saying, what they hope the audience would say, out loud?

20:28 - Why is it a bad idea to "feel" for your client, to "share your client's pain?"

STOP AT 20:45 to answer questions and discuss.

20:50 - Jan compares a lawyer who feels his clients pain to a doctor who "recoils at the sight of blood" - what does that mean?

21:10 - Does the judge "know" Mr. Facher? How do you know?

Does the judge know Jan? What might that mean to Jan?

Does Mr. Facher have Red Sox cap on? Any sign that he is a baseball fan?

How does the judge know Facher likes the Red Sox?

STOP - DISCUSS

EXPLAIN WHAT A CLOUD OF INPROPRIATY IS and what the point of it is.

This is a hearing where the lawyers can try to stop the trial before it starts. Each side is allowed to address whatever it is that might be a problem. If there is something serious, then the judge (and lawyers) won't want to waste their time

WHAT DOES STRATEGIC MEAN?

Migration - what is it (people, water, chemicals)?

Aquifer - flow of aquifer goes against the gravitational flow - is that possible?

23:15 - what does the judge think of Mr. Cheeseman? About Facher? About Jan?

- Why might Facher wait until court to repair his briefcase?
- Why does he have a broken briefcase? Does the briefcase have role in the story?
- Do you think he has a GOOD one somewhere??

23:30 - Why did Jan bother going over to Facher to say "Thank you."

Is he just polite, or is he being strategic?

23:45 - Who is the guy talking about, what is in the woods?

24:20 - How does Jan feel about a "big team"?

STOP

Paint solvent - what it is and what it can do (chemical)

Depose witnesses - what is it?

Seizure disorder, Miscarriage - what are they?

55-gallon drum - what are they and what are they used for?

24:30 - 55 gal drums disappear ... what do you think might have happened to them

Why are Jan's co-workers smiling?

Why is Jan asking them those questions, what is he trying to find out or get them to say?

26:03 - why did everyone stop when Al Love said he saw the stuff dumped?

26:35 - why does Cheeseman ask if the guy wants to take a break?

26:45 - Jan is all smiley when he starts asking more - why?

27:25 - The list that Jan looks at is a list of children and their ages (6 - 23) who are they?

28:00 - Cheeseman keeps saying that the guy doesn't have to answer the questions. Why?

Prepare kids regarding deposing witnesses - setting up witnesses

Timing ... will they want to put the guy, who describes his son's death, on to testify ... why or why not?

Beatrice Foods is represented by Facher and WR Grace by Cheesman

How will they make their wishes happen?

36:00 - what are "monitoring wells" (MUTE 36:58 "fuck")

Why is Jan doing this (the wells) ... is this a lot of work?

40:00 - The cost of the case ... this is a small firm ... is it smart to continue to push it?

Why or why not?

41:00 - The banker is thinking about a loan, what is he thinking?

42:30 - Are those guys staring at Al Love, in the cage?

Why is Al Love looking at the water?

STOP

Prepare students to listen to the statistics coming up.

48:00 - Statistics and explaining how lawsuits work

50:20 - Facher says he will not let the families take the stand ... why does he say that?

How can he stop them?

He says his company will pay expenses ... what are the expenses?

Why is he saying he will pay them?

Jan thinks that is just the beginning of negotiation, why does he think that?

Cheeseman says Grace wants to settle ("wants a number")

56:00 - Jan does not settle for \$ 25 million and in fact asks for \$ 320 million ... could he get more than \$ 25m?  
Should he take it?

MUTE 59:36 "fuck"

Facher is delaying, trying to cost Jan more money ... WHY?

Facher derides "pride" What is wrong with pride!!

1:04:25 - preacher man asking for money, why dose the movie include this clip?

1:15:00 where is the truth - really

1:30:00 What is the cost??? In money ... in pride ... in justice ...

Agreement is made, is it fair?

What about the apology

After the case is over, we see Jan in his new situation. Does he like his new situation? What could have happened for it to work out differently?

What is he going to do now?

What does he think about?

Does the movie have a happy ending? Explain your answer.

What do you think Jan is doing now, this year?

## Appendix C

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"DON'T!"

What Not To Do When Teaching Cases

Clyde Freeman Herreid

The following is a synopsis of Dr. Herreid's article

***Don't fail to prepare*** - Some teachers never adequately prepare, they won't have prepared the students or themselves for this major break from the traditional lecture format. They are under the illusion that a good discussion will just happen

***Don't start a discussion with a closed-ended question*** - The first question that the teacher asks is crucial. The primary criterion is to get students to talk, preferably thoughtfully. If you start with a question that is too obtuse, too formidable, or looks like a trick question, no one will answer. But there is another way to start off on the wrong foot. It is by asking a question that has a definite answer. Most students will be afraid of answering this even if they think they know it.

The best opening questions are open-ended, where there are multiple reasonable answers. Let's say that the case is about a scene is at a dinner table where a family argument is in full swing. Now, a non-threatening beginning might be to ask the students to identify the family members and indicate what their positions on the topic seem to be.

***Don't deal with controversial emotional material until you have analyzed the facts*** - The safest way to discuss a case is to be sure that everyone has a clear understanding of the facts. If students are confused on these, it will be rough sledding ahead. It is best to get all the facts straight at the outset. For instance, by getting the names of all of the participants and their positions established.

If you do give tests, your use of the blackboard will help save the day. Before you go into class, develop a blackboard plan. Decide how to organize the case. One common strategy is to write the facts of the case on the left side of the board as they emerge in the discussion. In the center of the board you might group the major issues of the case as they are analyzed. Finally, if you are dealing with a dilemma case where the protagonists have to make a decision, their possible choices and consequences could be enumerated on the right side of the board.

***Don't expect to have a great discussion until the students know one another*** - It is not enough to have their names; you must use them on every possible occasion. It won't be long before everyone in the room knows everyone else's name and this will greatly facilitate discussion.

***Don't forget to call on different people*** - I think it is essential to try to get everyone into the act, to get diversity into the discussion. One way is to simply keep your eyes open and watch student body language: are they leaning forward, nodding their head, frowning, opening their mouths as if beginning to speak? We all have these so-called "intention movements" when we have something to say. Watch and call on these people.

***Don't forget to listen to the students and respond to them*** - Speaking and listening are social arts—they go together. Good discussion requires the participants do more than simply wait their turn to speak; they need to connect their ideas with the others.

For the teacher, it means that he should periodically try to paraphrase students' points. The moderator must connect one student's ideas with another. He should ask John how his ideas square with Claudia's earlier point. To do this he must listen.

The instructor should operate at several levels during the discussion. At the first level he must be aware of the

case material and how to get the content out. At the second level he must be aware of the process, thinking about whom to call on next to spread the discussion about, how to resolve the conflict that has just exploded, how to stop the private conversation in the corner, how to move to engage the bored student sitting to his right, when to shift tempo.

And on the third level he is thinking of the bigger picture, how these people are doing in the course and how this case fits into the overall curriculum. He will be thinking how asking a particular question might affect a particular student; how to be encouraging to Jennifer and yet skeptical of Philip.

***Don't fret if the discussion isn't enthralling*** - It takes time to get good at anything. This goes for case teaching. The students need practice and so do you. Trust me, you'll get better.

Here is an important point: instructors often believe that the easiest way to break into case teaching is to try one each semester. No, the only way that you will have cases taken seriously and to get that enthralling discussion is to run several cases during the semester; then everyone will be comfortable with the method.

***Don't just have students discuss things, have them produce a product***- Discussions can often leave students and instructors with an unsatisfied feeling. Both may wonder what they really did accomplish. Board work isn't always enough. Giving the students a follow-up assignment usually does the trick. Have them write up a summary of the case, write a letter to their congressman, or develop a strategic plan. These are all good homework exercises. You don't have to have each student hand in a paper for each case. They might write up something for say half or a third of the cases. This approach makes the workload more manageable for everyone.

This brings you to the point where you should be ready to take the plunge into case teaching. Caution is needed, yes, but only so much can be done ahead of time. It is necessary to get some field experience as this anonymous rhyme highlights:

Mother may I go out to swim? Yes, my darling daughter. Hang your clothes on a hickory limb And don't go near the water.

Enough caution. Aspiring swimmers and case teachers have to dive in sometime. Make it soon, but just remember a final "don't":

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<https://teachers.yale.edu>

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