Risk Assessment Group Project

1. Submit a written risk assessment report, due at the beginning of class on March 15. This should include any background information you used in your risk assessment with proper references. (Due to time constraints you may not have time in class to present all of your “data”, but only the overall findings; however, this information should be included in your written report.) [60% of total score]

2. Present your site risk assessment to the class (max. 18 minutes per group, total; about 14 minute presentation and 4 minutes to answer questions). [40% of the total score]
   EVERYONE in group should present; have clearly visible visual aids!
   The class is your target audience, so tailor background information and terminology appropriately.
At the end of the class presentations, the entire class will fill out evaluation forms stating their opinions regarding the most hazardous site and the quality of the presentations.

Consider: lifetime cancer and non-cancer risks to exposed populations, number of people exposed, exposure routes... ecological impacts to various types of animals, plants, biota....

Start filling in each of the required sections of the report listed below using information available in the HRS document for your site. Then see the listed URLs to find additional information. See also State agencies, etc. Don’t spend too long looking for any single piece of information; email me if you need help.

* Each student will also submit a written statement regarding the distribution of work tasks within each group, and an evaluation of the “equality of effort” put forth by each group member. [scaling factor applied to group score; %]

Main sections and Recommended Content for Risk Assessment

1. Site Background (all this from HRS document)
   - Current site description - location, important nearby towns, streams, etc.; show a map!
   - Site History - as much information as can be found on how the site became contaminated, what activities occurred and when, emphasize types of waste generated (what compounds it contained) and where disposed
   - Site discovery - what led to “discovery” or reporting the site as a hazardous; HRS score

2. Site Data (include cross-section map, contaminant maps, etc. if available)
   NOTE: in some cases you will use “nearest” information available (may be local airport, etc) for climate, etc.
   NOTE: if there is a nearby Superfund site, much of the basic information will be similar, and may be available in more detail than your HRS: http://www.epa.gov/superfund/sites/npl/npl.htm OR due CERCLIS search at http://cfpub.epa.gov/superpad/cursites/srchsites.cfm; look at “additional site documents” for RODs, etc. from nearby sites)
   - surface features at the site and land use – maps.google.com (hybrid; also find schools, hospitals, etc);
     - historic ranges; see www.weatherunderground.com – season weather averages for temp, rain, snow)
   - www.wcc.nrcs.usda.gov/climate/windrose.html – wind speed and direction; important for air pathway
   - surface water - nearest, flow quantities, characteristics, uses (fishing, swimming, none)
   - national data for ~25,000 locations: http://waterdata.usgs.gov/nwis/sw; states also have own sites
   - hydrogeological information - regional geology/hydrogeology (type of soil, depth to water table,), groundwater gradient, aquifers, permeability; groundwater uses – may “estimate” n, k, etc. from soil type
   - http://nwis.waterdata.usgs.gov/usa/nwis/gwlevels GW data; ~800,000 sites nationwide
   - http://soils.usda.gov/survey/ soil data
   - ecological information - plants, wildlife, threatened and endangered species, fisheries, etc.
     http://www.fws.gov/
     http://ecos.fws.gov/tess_public/StateListing.do?state=all endangered species per state
     http://www.fws.gov/endangered/wildlife.html links to maps from each state
     http://www.fws.gov/nwi/ wetlands inventory
   - contaminants - any quantitative information you can find on the concentration and location of contaminants in soil, groundwater, surface water, and/or air – from the HRS document; some estimates based on partitioning for media not measured; etc.
3. Hazard Identification - for specific chemicals show available physical characteristics over the range of relevant site temperatures, select as surrogates those that represent various media (air, water, soil) and carcinogens vs non-carcinogens vs endocrine disruptors. This should include a Table; all contaminants noted in the HRS document and likely due to industrial activities, transformation in the environment, etc.
   MRL table to determine carcinogen vs NC; Endocrine disruptors: w- edcdb.nies.go.jp/chemhp_eu.php; www.ourstolenfuture.org/Basics/chemlist.htm

4. Human Exposure Assessment
   outline all current and likely future exposure routes,
   estimate for each case an approximate quantity of chemical ingested for each receptor
   pay careful attention to most sensitive or affected groups (such as children; on-site workers, etc.), and approximately how many people in each exposure group – if you have LOTS of routes, quantify for at least 10
   these calculations will require assumptions when data is not available; carefully list all the assumptions you used
   [you probably want to calculate approximate times associated with the future exposure scenarios, such as how long it should take the contaminants to reach a down-gradient drinking water well; it may be 20 yrs or 100 yrs or 500 yrs....which would be an important distinction in selecting clean-up strategies]
   SPECIFIC CALCULATIONS SHOULD BE INCLUDED IN APPENDICES. BE SURE TO HAVE AT LEAST ONE OTHER GROUP MEMBER CHECK THESE CALCULATIONS.

5. Toxicity Assessment
   gather all information available on the health effects of the various chemicals present (that were identified in your hazard ID stage). List ALL potential effects, including cancer (and types if known), specific non-cancer, endocrine disrupting, etc. This includes data from animal studies (doses and responses). Also, any officially recognized numbers such as carcinogen potency factors, reference doses or acceptable daily intake, OSHA threshold limit values, etc. See: http://www.epa.gov/iris/ ; http://www.atsdr.cdc.gov/toxpro2.html
   http://www.epa.gov/safewater/contaminants/index.html MCLs
   IF YOU CALCULATE YOUR OWN HUMAN DOSE:RESPONSE FACTORS FROM ANIMAL STUDIES, SHOW DETAILED CALCULATIONS IN AN APPENDIX, WITH ASSUMPTIONS EVIDENT

6. Human Risk Characterization
   using the exposure assessment information and toxicity assessment information, try to generate hazard index and cancer risk estimates. Uncertainties of these estimates should also be included. Here, be sure to include mixture effects. A table will be a good way to summarize this information.
   SPECIFIC CALCULATIONS SHOULD BE INCLUDED IN APPENDICES. BE SURE TO HAVE AT LEAST ONE OTHER GROUP MEMBER CHECK THESE CALCULATIONS.
   Conduct the risk assessment at pre-remediation conditions.

7. Ecological Risk Characterization
   For important target groups, conduct a risk assessment. Be as qualitative as possible. There may be fish and bird toxicity data (such as LD50 or LC50) available.
   http://www.epa.gov/region5superfund/ecology/html/screeningguide.htm Screening Benchmarks
   http://www.epa.gov/RCRIS-Region-5/ca/ESL.pdf one of the many screening tables available

8. Conclusions
   Your impressions of the overall magnitude of the risks posed by the site, and the urgency of taking steps to clean-up the site. Which pathways appear most critical (inhalation of volatiles, groundwater, surface water, blowing dust, etc)?

9. Reference List
10. Appendices

The report should include the four elements of a risk assessment. Think about the general site conditions, location and concentrations of contaminants, exposure routes, toxicology (toxic effects that result from exposures to given concentrations of contaminants), overall “risk” evaluation. Please follow good “report writing style” including:
a. **Title Page** - title of report, group member names, date, course and instructor

b. **Abstract** - provides effective summary of the major issues, procedures, findings,... 1 pg max

c. **Table of Contents** - describes layout, topic headings, page numbers

d. **Introduction** - makes clear the subject matter, scope, and organization of the report

e. **Mechanics** - spelling, sentence structure, headings, etc.

f. **Figures, Tables** as needed for clarity in the discussion; be sure to reference your reader to these in the text

g. **Conclusions** - strong close, your critical evaluation or impressions

h. **References** - proper in-text citations of references, reference list

   in text citation examples: xygenb t thgle thehe lthe al thjelk (Author last name, year).
   
   Smith (year) stated he believed....*paraphrase in your own words*
   
   Smith (year) states: “the appropriate response was...” *direct word-for-word quote*

   Reference citation:
   
   
   Last name, First, and First Last. Year. “Chapter.” Book. publisher. page.
   
   or other standard accepted style.....as long as all are consistent

i. **Appendices** - include your calculations, at least one detailed layout for each calculation (can be hand-written);
   please have the initials of the “calculation checker” on each page.

j. **Overall professional appearance**, typed, margins, pages numbered ...

Intermediate Submissions:

Site Data Progress: checklist of information in sections 1 and 2

Contaminant toxicity data (just a list with key chemicals and reference where you found the tox data)

Risk Pathways: list of the key risk pathways for which you plan to quantify risk estimate