

Lab: There is Murder in the Air

(modified from NYS Dept of Enviro Conservation & Clue by Hasbro)

Setup: First place all 6 character game pieces (whether you have 6 people playing or not) on the board at the starting squares marked with each color. Suspects: Black Lung Benny (black), Druscilla de Spilla (green), Electra Sparks (yellow), Petite La Wheeze (white), Radiation Ron (red), Plastic Pete (blue). The character game piece that each player is physically sitting closest to is the one they will use throughout the game. Next, separate the cards in to people, countries and air pollutants. Select a card out of each pile and put them (without looking at them) in the “Confidential Case File” envelope (essentially you should then have a person, air pollutant, and country in the envelope). Place the envelope in the center of the game board. Shuffle all of the rest of the cards and hand them out to each player, one at a time in a clockwise fashion, until all cards have been dealt. Do not let anyone see your cards!

Strategy: Use your detective pad to eliminate the possible suspects, countries, and air pollutants used in the murder. You should immediately check off the cards that were dealt to you (you know for a fact that those cards aren’t in the Confidential Case File envelope).

How to Play:

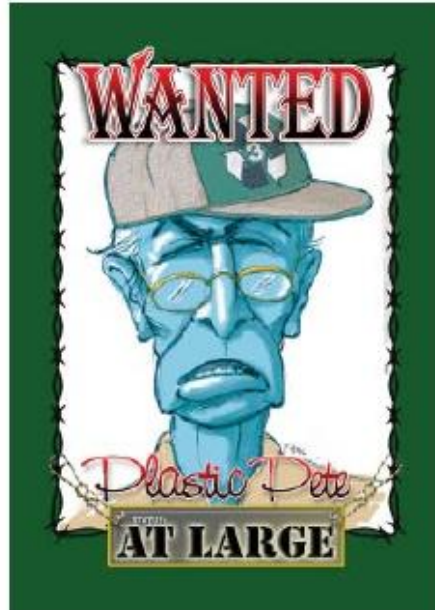
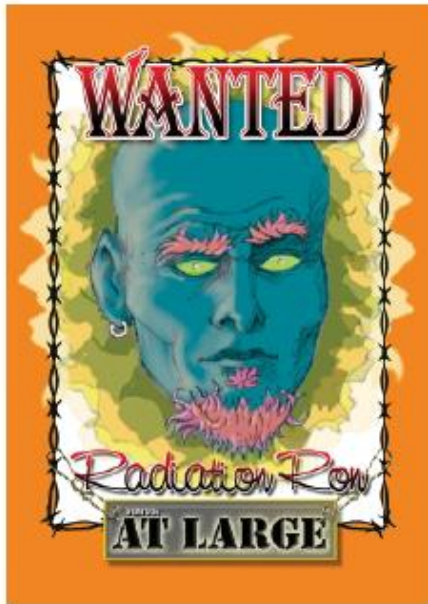
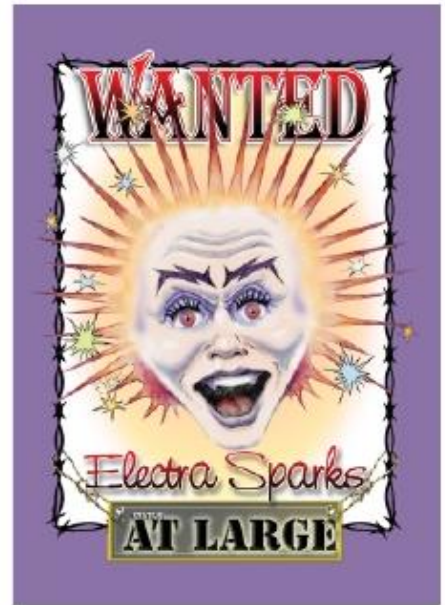
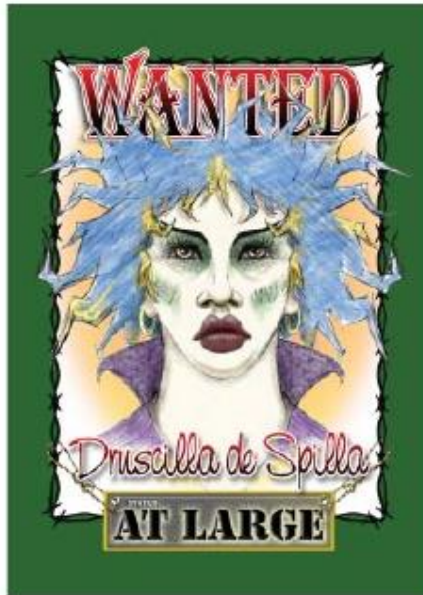
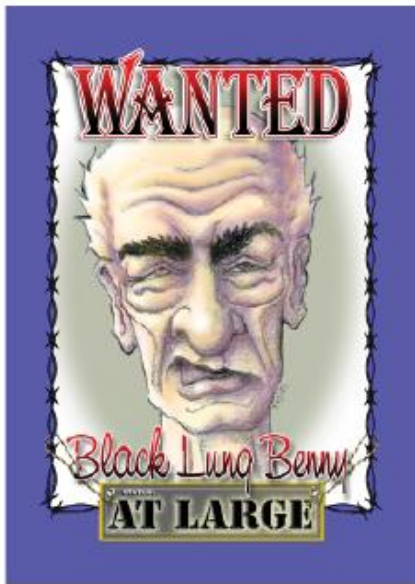
- The player that is using Plastic Pete (blue) goes first. From there, the turns go in a clockwise fashion.
- For each turn, a player will roll the die (unless using a secret passage) and advance their game piece towards the port of the country they are trying to enter.
- Players can move left, right, up, or down (no diagonal moving), but can’t move into a space that is already occupied by another player.
- You can use a secret passage as your turn if you are in a country that has that secret passage option on the board. You do not roll the die on this turn if you do use a secret passage.
- You cannot move through a port if the space is blocked by an opponent’s piece (it is possible to be stuck in a country if all ports are blocked, in which case you would have to pass on your turn until the country is unblocked).
- You can’t exit a country and then come back in on the same turn.
- Your game piece can also be moved into countries by other players making suggestions of your characters’ guilt in their particular country. (So if an opponent moves to Brazil and makes a suggestion involving your character, your game piece will be moved to Brazil)
- As soon as you enter a country you’ll make a suggestion. Making a suggestion helps eliminate the possibilities of which cards are in the Confidential Case File envelope.
- A suggestion consists of listing out loud: a person, an air pollutant, and the country that you entered. When you suggest a character, they must be present in that country with you. (if the character is not already in the room, move the character game piece to that room)
- There are 3 things to remember about making suggestions: You need to be in the country that you are suggesting; consider all character pieces as suspects (including your own and the ones that aren’t being used by players); there is no limit for the amount of character game pieces that can be in each country.
- As soon as you make a suggestion, the player to your left will look through their cards and see if any of them match (disprove) your suggestion. If they have any cards that were named in your suggestion, they have to show you (and only you) one of them. After it is showed, your turn is over. If the player to your left does not have a card that is named in your suggestion, they will say so and the next player to the left will have to disprove the suggestion. If it makes it all the way around the board without anyone being able to disprove your suggestion, you can make an accusation to win the game.
- Once it is your turn again, you must enter a new country or leave then come back to the same country (you can’t do this in one turn) before you can make a new suggestion.
- Making an Accusation: Make an accusation on your turn when you think you know which 3 cards are in the Confidential Case File envelope. This is done out loud so everyone can hear.
- Once an accusation is made, that same person will carefully check the envelope to see if they are right. If they are, the game is over and they win. If they are wrong, they carefully put the cards back in (without showing anyone) and forfeit the game. They still have to disprove other players’ suggestions by showing players their cards when asked, but won’t be playing other than that.
- You can make an accusation on the same turn that you made a suggestion.

Game Tally Sheet:

SUSPECTS	1st game	2nd game
Black Lung Benny (black)		
Druscilla de Spilla (green)		
Electra Sparks (yellow)		
Petite La Wheeze (white)		
Plastic Pete (blue)		
Radiation Ron (red)		
AIR POLLUTANTS		
Asbestos		
Carbon Monoxide		
Lead		
Mercury		
Nitrogen Oxides		
Ozone		
PM 10		
Radon		
Sulfur Dioxide		
COUNTRIES		
Brazil		
China		
India		
Mexico		
Nigeria		
Poland		
Saudi Arabia		
Turkey		
United States		

Final Analysis:

1. List the guilty person, air pollutant and country for the game you played.
2. For this outcome, relate the air pollutant with the possible source within the country given.
- 3-11. For each of the nine pollutants, provide a description and source.
12. Name the United States federal law that controls these pollutants.
13. Identify four of the nine pollutants that you think could be found in Cary, NC.
14. How could the effects of each of the four pollutants identified in #12 be mitigated?
15. Choose one pollutant you feel would most influence your life and explain why.



Environmental Collector Card 201

POLLUTANT:

Lead (Pb)

DESCRIPTION: (Element) Lead is a soft, bluish-gray heavy metal that is highly poisonous and may be present in air, water and soil.

CRIME: Children are most at risk from eating lead-contaminated paint chips, dust or soil. Lead poisoning in children can result in learning disabilities and behavioral problems. Pb can also affect blood, bones, and organs.

CAUSE: Pb has been phased out of many consumer products such as household paint, batteries, and gasoline. Some imported toys and jewelry contain dangerous levels of Pb. Airborne Pb comes from lead smelting and from burning coal, oil, and waste.

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Environmental Collector Card 202

POLLUTANT:

Carbon Monoxide (CO)

DESCRIPTION: (Chemical Compound) Carbon monoxide is a colorless, odorless gas.

CRIME: Breathing CO can cause serious health effects, or even death, because it replaces oxygen in the bloodstream.

CAUSE: CO is produced from the incomplete burning of fuel. Although emission controls are required, the large number of vehicles on the road make this the largest source of CO pollution. Indoors, CO may be produced at dangerous levels by unvented gas and kerosene heaters, wood stoves, and cigarette smoke.

NYS Department of Environmental Conservation



Environmental Collector Card 203

POLLUTANT:

PM 10

DESCRIPTION: PM 10 is a generic name for particulate matter between 2.5 and 10 microns in diameter.

CRIME: PM 10 can cause breathing difficulties and lung damage. It has been linked to cancer and heart attacks.

CAUSE: PM 10 enters the air from the burning of fossil fuels in powerplants, factory operations, and motor vehicles; wood-burning stoves; and blowing dust from roadways, agricultural fields and construction sites.

NYS Department of Environmental Conservation



Environmental Collector Card 204

POLLUTANT:

Nitrogen Oxides (NO_x)

DESCRIPTION: (Chemical Compound) NO_x is the generic term for a group of highly reactive gases containing nitrogen and oxygen. Many NO_x are colorless and odorless, but nitrogen dioxide (NO₂) can combine with particles in the air to form a reddish-brown haze over urban areas.

CRIME: NO_x can cause respiratory problems.

CAUSE: NO_x comes from the reaction of nitrogen and oxygen during the burning of coal, oil and gas. Motor vehicles and power plants are large sources of NO_x. NO_x are important ingredients in ground-level ozone or smog, particulate matter and precursors to the formation of acid rain.

NYS Department of Environmental Conservation



Environmental Collector Card 205

POLLUTANT:

Sulphur Dioxide (SO₂)

DESCRIPTION: (Chemical Compound) Sulfur dioxide is a colorless gas with a pungent odor and taste.

CRIME: SO₂ causes irritation and permanent damage to the lungs. SO₂ can be transported over long distances. It contributes to the formation of acid rain, which damages plant and animal life, buildings and electrical equipment. Inhalable sulfate particulate matter formed from SO₂ can impair visibility. Further reductions of SO₂ emissions are necessary.

CAUSE: SO₂ emissions result from oil refineries, the burning of fossil fuels at power plants and in boilers.

NYS Department of Environmental Conservation



Environmental Collector Card 206

POLLUTANT:

Ozone (O₃)

DESCRIPTION: Ozone is a colorless gas with an acrid odor.

CRIME: O₃ can cause respiratory symptoms ranging from irritation and coughing to asthma and severe breathing problems in sensitive people, especially the elderly and small children. It is dangerous to be active outside when the ozone level is high, especially for children.

CAUSE: Ground-level ozone is the main ingredient in smog. It is formed by a chemical reaction between volatile organic compounds and nitrogen oxides in the presence of sunlight. Ozone concentrations can reach unhealthy levels on hot, sunny, calm days.

NYS Department of Environmental Conservation



Environmental Collector Card 209

POLLUTANT:

Mercury (Hg)

DESCRIPTION: (Element) Mercury is a toxic metal that breaks down slowly and takes several forms: a silver liquid; a white powder or crystal; and methylmercury, an organic form that accumulates in the food chain.

CRIME: Hg may cause neurological, digestive and kidney problems. Unborn and very young children are especially sensitive.

CAUSE: Exposure to Hg is through contaminated air, food (especially certain fish), water and skin contact. Hg occurs naturally, but also comes from burning fossil fuels, mining, smelting, and solid waste incineration.

NYS Department of Environmental Conservation



Environmental Collector Card 211

POLLUTANT:

Asbestos

DESCRIPTION: Asbestos is a group of 6 fibrous minerals that occur naturally in soil and rocks: amosite, chrysotile, crocidolite, tremolite, actinolite, and anthophyllite. It is fireproof, chemically resistant, and doesn't conduct electricity.

CRIME: Inhaling asbestos can cause lung cancer and asbestosis, (a disease causing breathing problems) and heart disease.

CAUSE: New uses for asbestos are banned, but due to its heat and chemical resistance, old uses like roofing shingles, ceiling and floor tiles, car brake pads, transmission parts and cement are allowed. Asbestos fibers can enter the environment when natural deposits or asbestos products are disturbed, weathered or worn.

NYS Department of Environmental Conservation



Environmental Collector Card 213

POLLUTANT:

Radon (Rn)

DESCRIPTION: (Element) Radon is a naturally occurring gas that comes from various rocks, soils, and underground water sources.

CRIME: Radon gives off radiation that can cause lung cancer. Radon is second only to smoking as a cause of lung cancer.

CAUSE: Radon forms from the breakdown of the natural elements uranium and radium. Radon comes from the ground and can enter a building from the soil. You can test your home for radon with an in-home radon test kit. When necessary, radon can be removed from your home by installing ventilation systems.

NYS Department of Environmental Conservation



Nigeria



Size: twice California
Population: 186 million

Brazil



Size: slightly smaller than US
Population: 205.8 million

Saudi Arabia



Size: approx. 1/5 of US
Population: 28 million

China



Size: slightly smaller than US
Population: 1,374 million

Poland



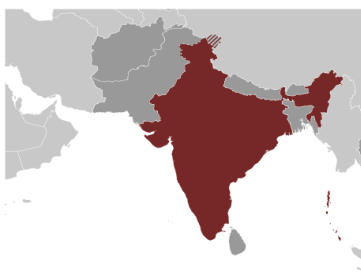
Size: twice Georgia
Population: 38.5 million

Mexico



Size: 3 times size of Texas
Population: 123 million

India



Size: approx. 1/3 of US
Population: 1,267 million

United States



Size: slightly larger than China
Population: 324 million

Turkey



Size: slightly larger than Texas
Population: 80.3 million

