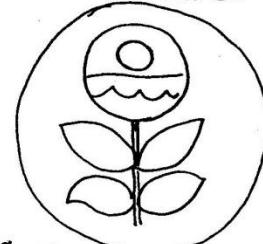


CHOOSE YOUR
OWN
HAZ-MAT
ADVENTURE,
GAME!



Hi there! Welcome
to **CHOOSE YOUR OWN**
HAZ-MAT ADVENTURE,
a game in which you
get to learn all
about **ME**, Sally Sludge,
and my friends!

UNITED STATES



ENVIRONMENTAL
PROTECTION
AGENCY

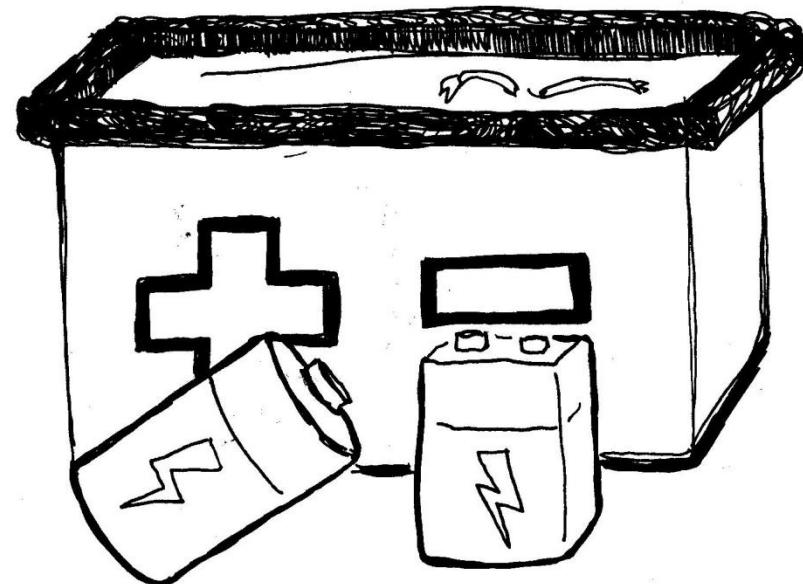
I'M A HAZARDOUS MATERIAL (HAZ-MAT) AS CLASSIFIED BY THE ENVIRONMENTAL PROTECTION AGENCY (EPA) AND I'M REALLY COMMON IN THE DEVELOPED WORLD

WHO IS "DEVELOPED?"



IN FACT...

YOU PROBABLY HAVE ME OR
MY FRIENDS HANGING OUT IN YOUR
GARAGE!



DEAD BATTERIES

...to name a few!

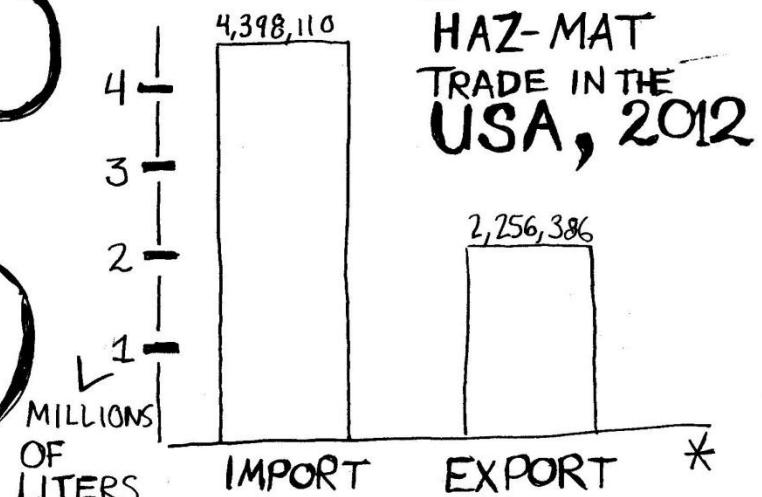


PESTICIDES &
POISONS



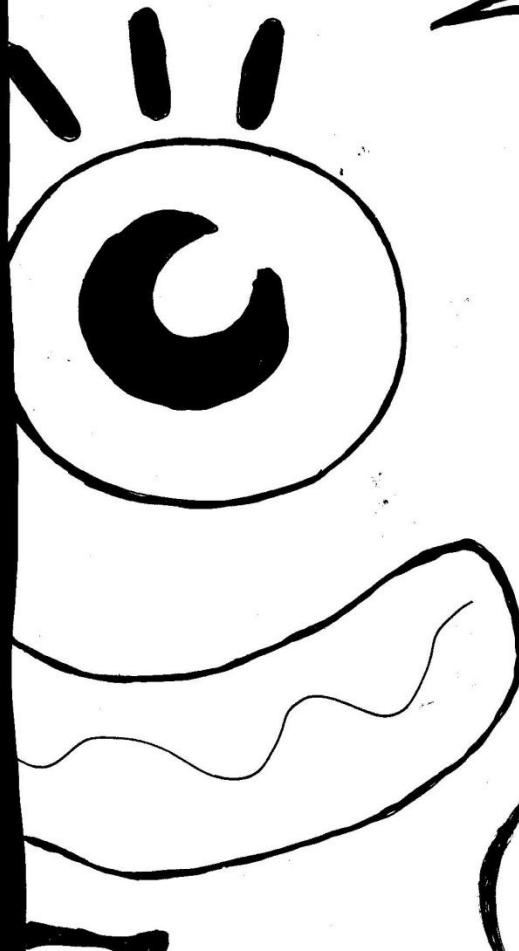


US HAZ-MATS ARE REALLY POPULAR IN THE UNITED STATES-BECAUSE COMPANIES CAN MAKE MONEY BY STORING US! THAT IS THE REASON THAT THE USA IS A NET IMPORTER OF HAZ-MATS.



BET YOU DIDN'T KNOW THAT ONE, DID YOU?

* N.B. NUMBERS DO NOT INCLUDE UNITS OF MASS DUE TO ISSUES WITH THE EPA'S DATASET: SEE 'HOW THIS BOOK WAS MADE'



DO YOU WANT ME TO
EXPLAIN WHAT A
HAZ-MAT IS?



OKAY! KEEP READING!



NO! I JUST
WANT TO PLAY
THE GAME!

TURN TO PAGE

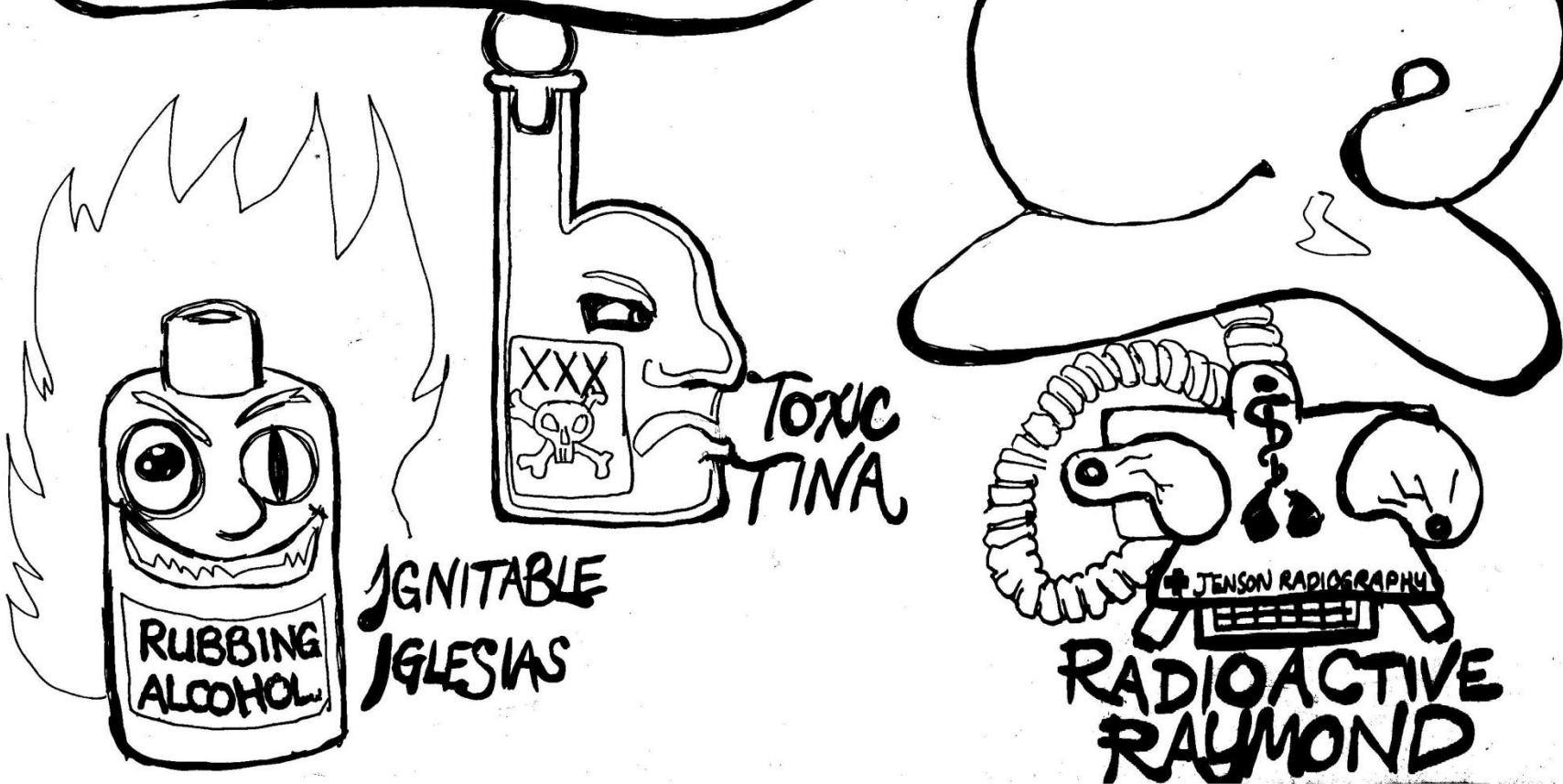
HAZ-MATS HAVE A TRICKY DEFINITION.

THE EPA HAS A COMPLICATED FLOW CHART TO DETERMINE WHETHER A WASTE CLASSIFIES AS HAZARDOUS, WHICH IS BASED ON THE CODE OF FEDERAL REGULATIONS 261.31, 261.32, 261.33 AND SUBTITLE C.

→ If that means anything to you, then you probably know so much about haz-mats that you can skip to page **to start the game!**



HAZARDOUS WASTE IS
ALWAYS CLASSIFIED AS
'SOLID WASTE' AND GENERALLY
HAS A 'BAD' CHARACTERISTIC
THAT MAKES IT HAZARDOUS.



HAZ-MATS CAN BE CORROSIVE, RADIOACTIVE, REACTIVE, TOXIC, IGNITABLE, OR OTHERWISE **BAD** TO BE AROUND. THE EPA KEEPS FOUR LISTS OF HAZARDOUS WASTE:

F LIST

F LIST WASTES ARE FROM MANY KINDS OF MANUFACTURING PROCESSES ACROSS INDUSTRY. F-LIST WASTES ARE THEREFORE 'NON-SPECIFIC SOURCE' WASTE.

K LIST

K LIST WASTES COME FROM INDUSTRY-SPECIFIC PROCESSES, LIKE PETROLEUM REFINING.

P+U LISTS

(HEY, THAT'S A PUN!)

CERTAIN KINDS OF UNUSED CHEMICALS* FALL ON THIS LIST.
* E.G. AN OLD BOTTLE OF NAIL POLISH! THESE CHEMS ARE NOT BYPRODUCTS.



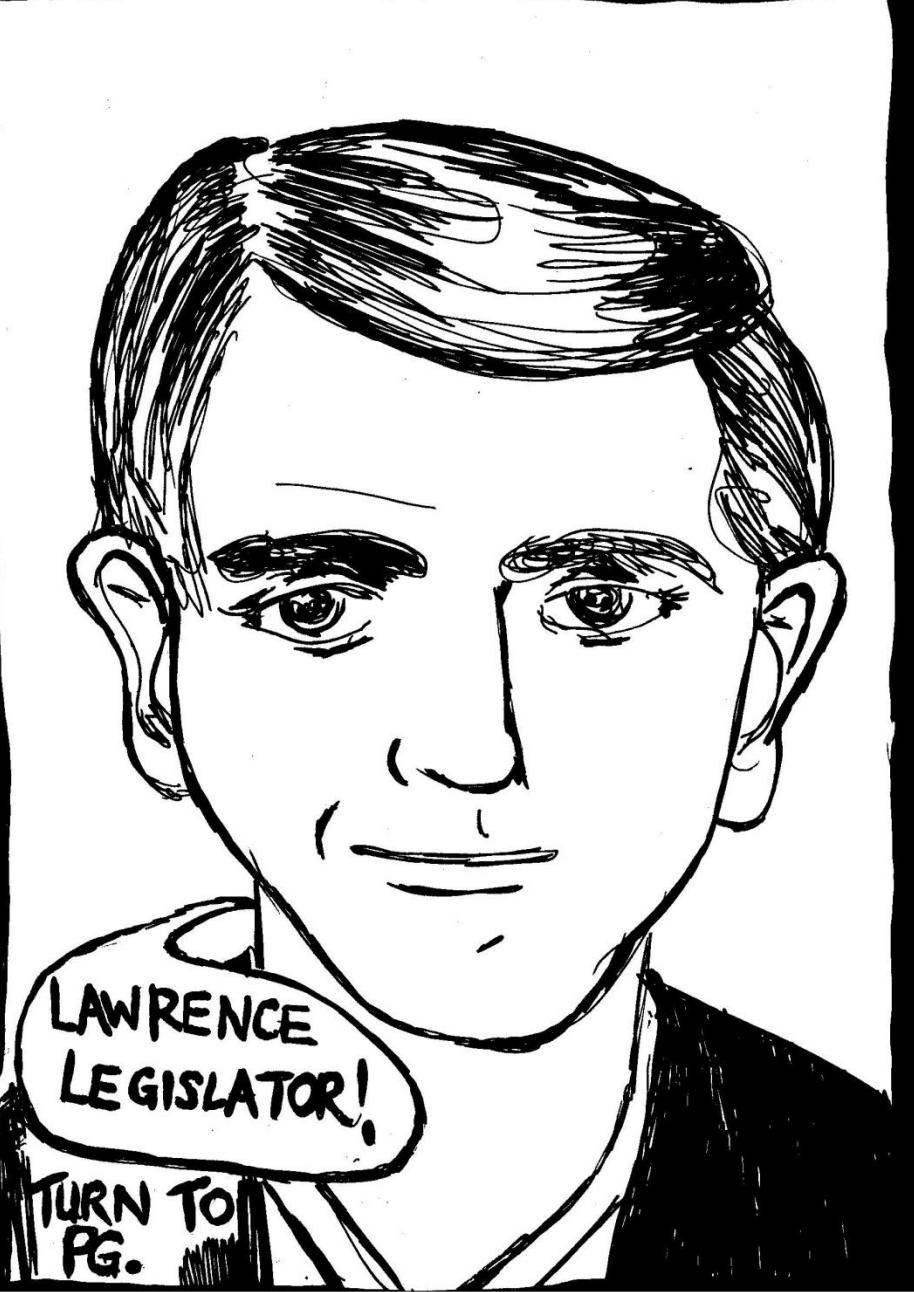
If you have potentially hazardous waste, contact your state solid waste official to determine what to do about it!

**WOW! IF YOU MADE IT THIS FAR,
YOU MUST BE REALLY INTERESTED
IN HAZARDOUS WASTE!**



SO, WHO ARE YOU?





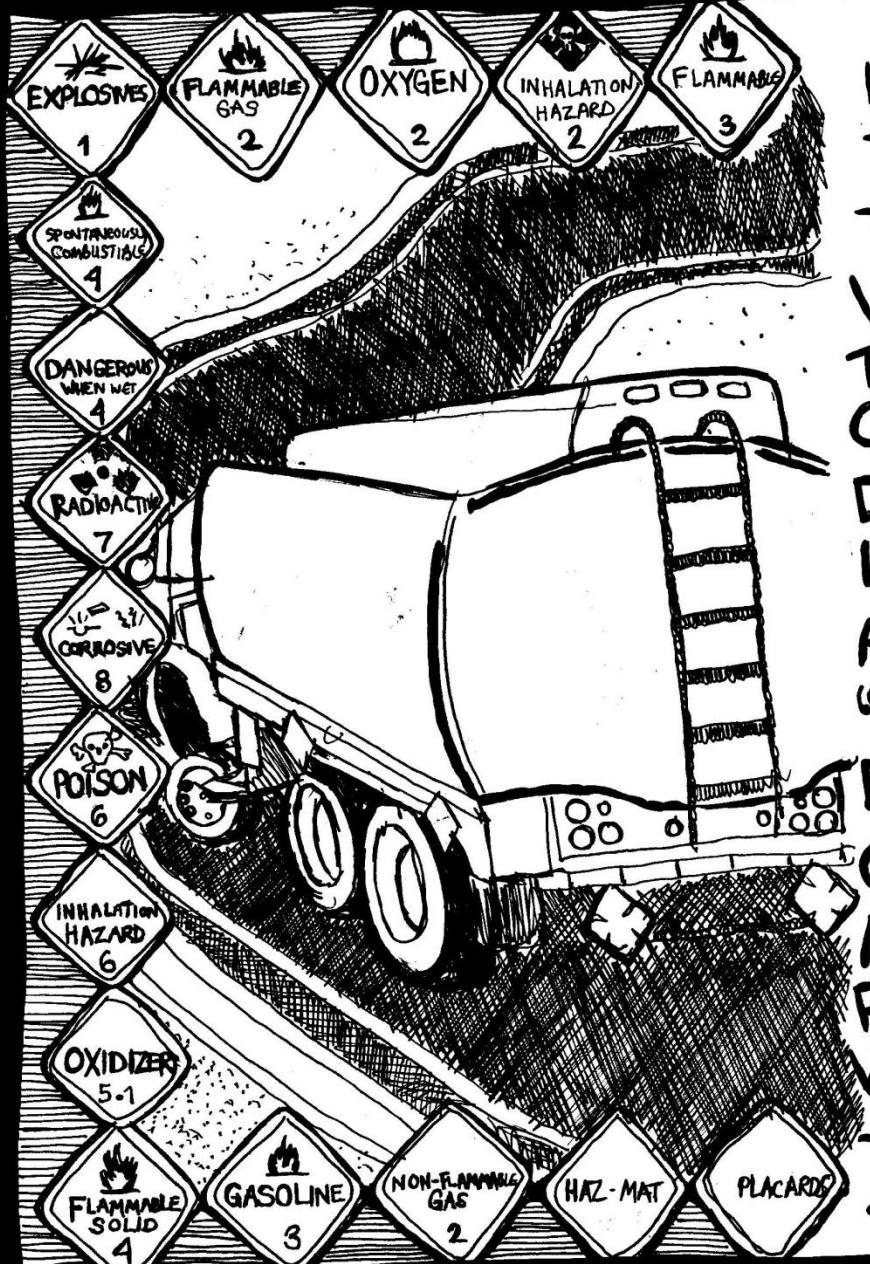




HI THERE! I'M TERRY, NICE TO MEET YOU!

I AM A TRUCK DRIVER. YOU MAY THINK THAT THIS IS AN UNUSUAL JOB FOR A WOMAN, BUT THERE ARE OVER 200,000 OF US IN THIS PROFESSION. AND WE'RE GOOD AT IT! STUDIES SUGGEST THAT WE DRIVE LESS AGGRESSIVELY THAN OUR PEERS.

YOU CAN BE GLAD FOR THAT BECAUSE OF WHAT I HAUL AROUND - HAZARDOUS WASTE FOR A MAJOR IMPORTER.



I HAD TO PASS A TEST TO TRANSPORT HAZARDOUS MATERIALS. THE DEPARTMENT OF MOTOR VEHICLES CONSIDERS HAZ-MATS TO BE ANY PRODUCT THAT COULD HURT SOMEONE OR DAMAGE PROPERTY. SOMETIMES I SEE HAZ-MATS ABBREVIATED AS HME OR HM, WHICH ARE "TRUCKIE" SPEAK FOR DANGEROUS MATERIALS.

OF COURSE HAZ-MATS ARE MORE THAN JUST WASTE PRODUCTS, BUT WASTE IS WHAT I'M PAID TO DELIVER!

THERE'S A LOT OF RULES THAT TRY TO MAKE THIS SAFE . . .

FOR ALL OF US.

THE SHIPPER IS RESPONSIBLE
FOR PACKING THE WASTE SAFELY.
I HAVE TO TRUST THAT THEY DID
IT RIGHT, BECAUSE I DON'T HAVE
A DEGREE IN THIS STUFF, YOU
KNOW? I JUST CARRY IT FROM
POINT A TO POINT B AND
MAKE SURE IT ARRIVES SAFELY.
THE COMPANY I WORK FOR
GAVE ME SPECIAL DRIVER'S
TRAINING ON HOW TO DO THIS
AFTER I WAS HIRED.

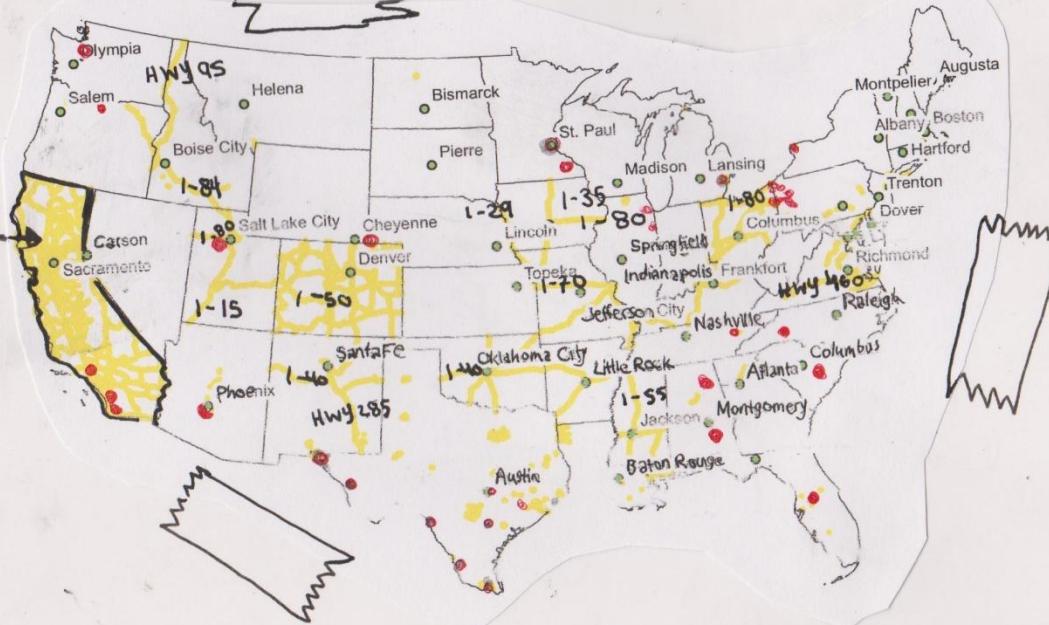


THE GOVERNMENT MAINTAINS A LIST OF ROADS THAT I AM ALLOWED TO DRIVE ON, CALLED THE USDOT (US DEPARTMENT OF TRANSPORTATION) HAZARDOUS MATERIAL ROUTES. MY COMPANY HAS PURCHASED SOFTWARE THAT TELLS ME THE ROADS I AM ALLOWED TO DRIVE ON. SINCE THE 'OKAY' ROADS CHANGE DEPENDING ON THE HAZ-MAT I AM CARRYING AND WHETHER OR NOT I'VE GOT A 'GOLDEN TICKET'-A SPECIAL PERMIT ENABLING ME TO DRIVE WHEREVER I WANT- THERE'S JUST NO WAY I CAN KEEP TRACK OF IT!

HOWEVER, THIS HAZ-MAT ROUTING INFORMATION ISN'T REALLY AVAILABLE TO JOHN Q PUBLIC EVEN THOUGH MY FAMILY & FRIENDS OFTEN ASK FOR IT.

THIS IS ABOUT THE BEST THAT I CAN PROVIDE THEM WITH - FOUND IT ONLINE. ROUGH, ISN'T IT? I SCRIBBLED ROUTE NUMBERS ON TOP OF IT - AND THE PLACES I DROP OFF WASTE.

(HOPE YOU CAN READ MY HANDWRITING!)



HAZ
MAT
LAND-
IS THIS WHY
EVERYTHING
HAS THE
LABEL

"KNOWN BY THE
STATE OF CALIFORNIA
TO CAUSE CANCER"?

• Waste deposit locations
CLEARLY,
THERE ARE
OTHER ROADS
I TRAVEL ON
TO REACH
THESE
SITES!

* THIS MAP WAS MADE USING
SOMETHING CALLED ARCMAP. IT
MUST NOT BE VERY GOOD WITH
ALL THOSE ROADS MISSING. • [THAT'S THE
GOV FOR YOU]

I HAVE HEARD SOME BAD STORIES FROM HAZ-MAT TRUCKIES WHO GOT INTO ACCIDENTS.

IN FACT, JUST THIS JANUARY A HORRIBLE ACCIDENT HAPPENED ON I-94 IN MICHIGAN.

A FIREWORKS AND A NEARBY TRUCK CARRYING FORMIC ACID CAUGHT FIRE

TRUCK EXPLODED.



193 CARS WERE INVOLVED IN THE CRASH.

AND ONE TRUCKIE, WHO WAS NOT CARRYING HAZ-MATS, DIED ON THE ROAD. TWO OTHERS WERE ALSO KILLED. TERRIBLE.

I'M DRIVING THROUGH KALAMAZOO COUNTY WHERE THE PILE-UP OCCURED, AND I CAN'T HELP BUT FEEL A LITTLE NERVOUS.

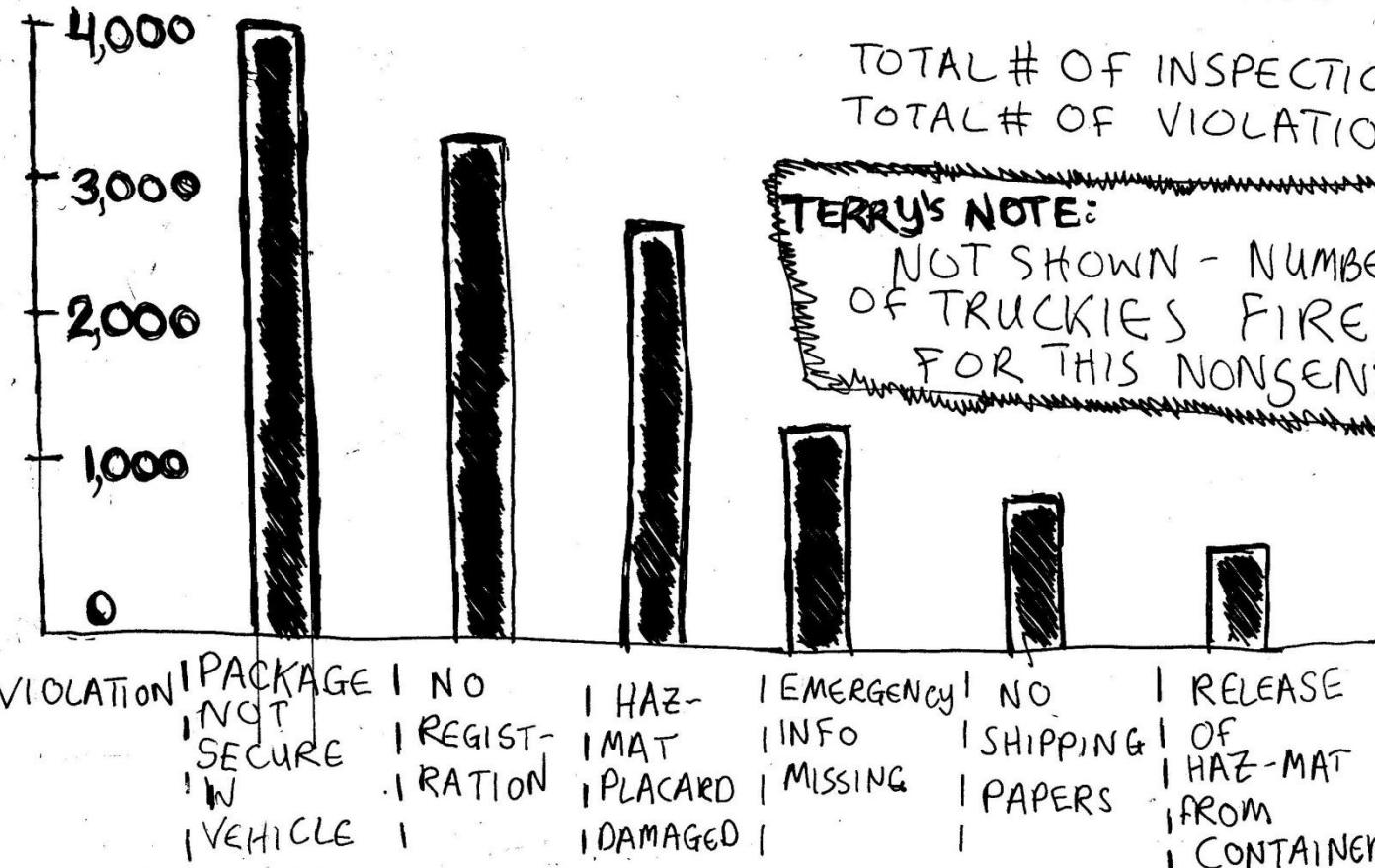
THE DRIVERS ON I-94 TOLD ME THE ACCIDENT HAD BEEN CAUSED BY BLACK ICE. AND NO MATTER HOW GREAT OF A DRIVER YOU ARE, THERE'S SOME SITUATIONS IN WHICH NO AMOUNT OF SKILL WILL PREVENT AN ACCIDENT.

THAT IS THE RISK.

WHICH IS NOT TO SAY WE DON'T SCREW UP
EVERY NOW AND AGAIN. - **BUT SCREWING UP MEANS**
LOSING
YOUR
JOB!

HAZ-MAT VIOLATIONS 2014

FROM THE FEDERAL MOTOR CARRIER SAFETY
ADMINISTRATION



TOTAL # OF INSPECTIONS - 195,085

TOTAL # OF VIOLATIONS - 44,821

TERRY'S NOTE:

NOT SHOWN - NUMBER
OF TRUCKIES FIRED
FOR THIS NONSENSE!



BUT WE ARE PROFESSIONALS AND WE ARE PAID TO TAKE THE RISKS. THE PAY IS PRETTY GOOD. THE AVERAGE FOR A CLASS A CDL DRIVER (FANCY HAZ-MAT LICENSE!) IS \$**57,000** A YEAR. THAT'S PRETTY DAMN GOOD FOR A JOB THAT DOESN'T REQUIRE A DEGREE!

NEXT TO ICE ROAD TRUCKING, DRIVING HAZ-MAT TAKES THE MOST SKILL BECAUSE WE NEED TO MAKE SURE NOTHING SHIFTS AROUND IN THE BACK OF THE TRUCK. AND THAT'S WHY WE GET GOOD PAY. I LIKE MY JOB AND I'M PROUD OF THE WORK THAT I DO. I WOULDN'T PICK A DIFFERENT CAREER.

"CHARLIE CEO"

- RUNS THE HAZ MAT SITE THAT TERRY DROPS HER LOAD OFF AT.
- 50 YEAR OLD EX-HIPPIE.
- KERT THE DREADLOCKS.
- STILL LISTENS TO THE WHO EVERY DAY & SMOKES.

WASP

CONCERN'S AROUND
HAZ-MATS.

HOW MUCH ARE MY COMPETITORS IMPORTING?

WHAT KINDS OF WASTE IS DROPPED OFF AT MY FACILITY?

AM I MEETING OSHA STANDARDS?

IS IT HARD TO MEET THESE STANDARDS?

WHAT ARE THE LAWS WITH WHICH I MUST COMPLY?

DOES LOCAL LAW DIFFER FROM FEDERAL LAW? HAVE I TRIED TO GET SOME KIND OF EXEMPTION?

WHAT IS MY SALARY?

CAN I PROFIT FROM IMPORTING LOCALLY?

WHAT IS THE EFFICIENCY OF MY SUPPLY CHAIN' OF HAZ-MATS?

DO I PRODUCE ANY HAZ-MATS?

HAVE I BEEN SUBJECTED TO PRESSURE
BY COMMUNITY ACTIVISTS?

"MARYANNE THE MOM"

- 24, 2 KIDS, 1 W/ SPECIAL NEEDS
- HISPANIC, LOW INCOME
- LIVES NEAR CHARLIE'S PLANT BUT DOES NOT WORK IN IT
- SINGLE MOM
- RETAIL STORE MANAGER, HARDWORKING, COMMUTES TO A LARGER TOWN EVERY DAY FOR WORK.
- LEAVES KIDS W/ GRANDPARENTS BUT WORRIES ABOUT HER BABY W/ SPECIAL NEEDS.
- WONDERS IF PROBLEMS WERE CAUSED BY THE PLANT BUT KNOWS SHE CAN'T PROVE IT
- WANTS TO MOVE AWAY BUT CAN'T AFFORD IT

- BEGAN TO ASK AROUND TO SEE IF DISEASE RATES WERE HIGHER AROUND CHARLIE'S PLANT.



Choropleth map of developmental disabilities & disease rates; diverging color scheme emphasizing the difference from the meso

- PEOPLE GOT PISSED OFF AT HER FOR EVEN ASKING THE QUESTION BECAUSE CHARLIE PAYS GOOD WAGES

'LAUREN THE LABORER'

55 YEARS OLD. BLACK.
WORKS FOR CHARLIE AT THE
PLANT. HAS CANCER.

EVEN THOUGH SHE IS PAID
WELL SHE CAN'T TRAVEL
FAR FOR TREATMENT.

CAN'T STOP WORKING OR SHE
CAN'T PAY BILLS.

FRIENDS AT THE PLANT
HAVE TURNED AGAINST
HER BECAUSE SHE BLAMES
CHARLIE.

SOME PART OF HER IS STILL
PROUD OF HER WORK EVEN
THOUGH IT IS KILLING
HER

ADULT
HER & CHILDREN PLAN TO MOVE
TO THE LIVE IN A LARGE

RELIES ON THE CHURCH TO
GET THROUGH THE DAY BECAUSE
THERE IS NO OTHER HOPE FOR
HER.

MAP-

FINANCIAL LIMITATIONS OF
LAUREN'S TRAVEL

FLOW CHART OF LAUREN'S
HEALTH DECISIONS—
TREATMENT OR WORK?

LAWRENCE THE LEGISLATOR

RUN MAYOR OF THE SMALL TOWN.
REPUBLICAN. HISPANIC.
KNOWS HIS CONSTITUENTS.
RELIGIOUS - CONSERVATIVE
PROTESTANT. CONVERTED
FROM CATHOLICISM.

NANTS JOB CREATION &
INVESTMENT IN THE COMMUNITY.
CHARLIE CEO PAYS LOTS IN \$
WHICH HAS ALLOWED HIM TO COMPLETE
SEVERAL CIVIC WORKS PROJECTS
THAT WOULDNT HAVE OTHERWISE
SEEN POSSIBLE.

INTENSELY DISLIKES THOSE WHO
TRY TO TELL HIM WHAT TO DO
WHO DONT LIVE IN THE TOWN
(E.G. EAST COAST RICA LIBERALS)

HAS ASPIRATIONS BEYOND THE
TOWN & LOOKS AT WHAT HAPPENS
IN HIS COHORT OF REPUBLICAN
GOVERNMENT OFFICIALS -
TRIES TO KEEP A FINGER IN
THE WIND.

MAPS

- PROFIT, US VS. THEM
- AMOUNT OF \$ PUMPED INTO
THE COMMUNITY
- LOCATIONS OF CONSTITUENT
- NATURAL RESOURCES THAT
COULD CONTRIBUTE TO THE TOWN

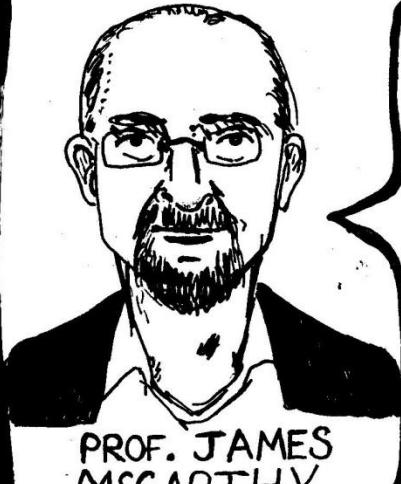
HOW THIS BOOK WAS MADE!



CHELSEA CARTOGRAPHER,

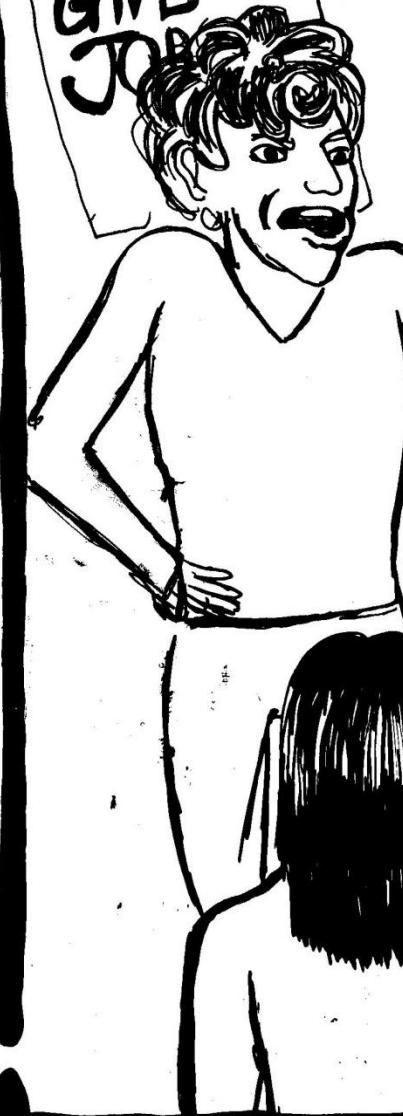
(otherwise known as Vanth)

HI! I'M CHELSEA CARTOGRAPHER. I AM A MASTER'S STUDENT AT UW-MADISON. AS AN UNDERGRADUATE AT PENN STATE I TOOK A COURSE WITH ENVIRONMENTAL HISTORIAN JAMES McCARTHY, CALLED POLITICS OF THE ENVIRONMENT.



"POLITICS OF
THE
ENVIRONMENT
MAY SEEM
SIMPLE TO
ENVIRONMENTALISTS:

POLLUTION BAD! CLEAN LAND
GOOD! BUT WHEN THE
MOTIVATIONS OF INDIVIDUAL
ACTORS ARE EXAMINED,
MANY PEOPLE HAVE STRONG
REASONS TO BELIEVE
POLLUTING THE ENVIRON-
MENT IS OKAY."



PROF. McCARTHY MADE A POINT WHICH
HAS STUCK WITH ME EVER SINCE...



RIGHT. SO, PEOPLE
LIKE TO BELIEVE
THAT THEY ARE
GOOD AND DO THE
RIGHT THING.

* This is my paraphrasing of what
Prof. McCarthy said. Any inelegance of
speech or misinterpretation is my own!



THEY JUST DON'T
WAKE UP AND
SAY,
"I WANT TO BE
EVIL TODAY."

!

WOOAH!

MIND
BLOWN.

SINCE THEN, I HAVE BEEN INTERESTED IN EXAMINING PROBLEMS THROUGH AN ACTOR-BASED PERSPECTIVE.
AS A CARTOGRAPHER, I FOUND MAPS WERE A GOOD WAY TO DO THIS BUT SOMETIMES WERE LIMITED BY THE CONSTRAINTS OF



PRESENTING EVERYTHING
ON ONE SPACE WITH
A MINIMUM OF TEXT. *

A VISUAL STORYTELLING APPROACH BLENDS THE BEST OF ALL WORLDS. I REMEMBERED READING "CHOOSE YOUR OWN ADVENTURE!" BOOKS AS A CHILD, IN WHICH THE CHARACTERS IN HABITED THE SAME WORLD BUT HAD A VERY DIFFERENT EXPERIENCE OF THAT WORLD. EACH TIME I WOULD PICK A DIFFERENT CHARACTER AND THE STORY CHANGED, BUT I ALSO LEARNED MORE ABOUT THE WORLD.

*AND INK TOO, FOR THOSE WHO TAKE EDWARD TUFTE'S APPROACH ...

~~CHARJUNK~~

DATA / INK RATIO:
ENSURE
NOT ONE DROP
OF INK IS
WASTED!

CHOOSE YOUR
OWN
ADVENTURE!
AT
T H E

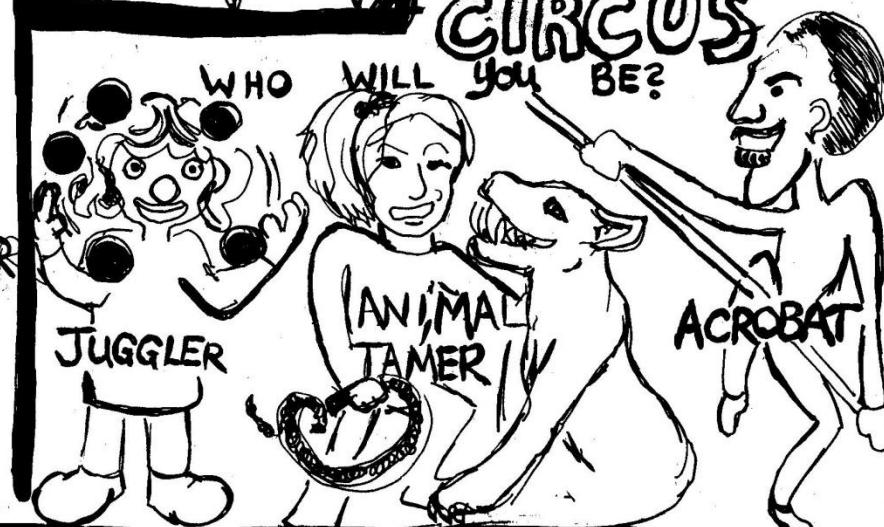
CIRCUS

WHO WILL YOU BE?

JUGGLER

ANIMAL
TAMER

ACROBAT



THIS SEEMED TO FIT THE ACTOR-BASED EXPERIENCES OF HAZ-MATS I WANTED TO PRESENT.

I CREATED SIX SCENARIOS AND SUPPLEMENTED THE DATASET FROM THE EPA WITH OTHER RESOURCES.

TERRY

TRUCK DRIVER



CHARLIE

CHIEF EXECUTIVE OFFICER

THE

THE



MARYANNE

MOMMY



MY GOAL IS TO HUMANIZE THE DATASET FROM THE EPA, WHICH DOES NOT SHOW THE EMOTIONS AND MOTIVATIONS OF INDIVIDUAL ACTORS, WHO HAVE VERY DIFFERENT EXPERIENCES AND OPINIONS ABOUT HAZ-MATS IN THE USA. IN THE FOLLOWING PAGES I DOCUMENT MY SOURCES FOR EACH SCENARIO AND ANY CAVEATS ABOUT THE DEPICTIONS OF THE ACTORS. ALL MISTAKES ARE MY OWN.

BUT . . .

LAWRENCE
LEGISLATOR



LAUREN
THE LABORER



CHELSEA
CARTOGRAPHER



THERE ARE ALSO PROBLEMS WITH THE
EPA DATASET AND THESE PROBLEMS
COMPLICATED THE ANALYSIS.



WHY ARE THERE
SO MANY
MISSING OR
DUPLICATE
ENTRIES?

WHY ARE
AMOUNTS OF WASTE
REPORTED IN
WEIGHT VOLUME?!
THEY CAN'T BE RECONCILED!

WHY DIDN'T THE EPA
STANDARDIZE THIS
DATA?!

WHAT THE HELL
DO THESE CODES
MEAN?!
WHY IS THE 118 PAGE
'EASY TO UNDERSTAND'
HAZ-MAT GUIDE
NEARLY INCOMPREHEN-
SIBLE?!

PUTTING DATA IN PDF'S IS NOT
USER FRIENDLY!

NUMBER CRUNCHING, DATABASE QUERIES AND GEOGRAPHIC ANALYSIS EXPOSED INCONSISTENCIES . . .



DID THE EPA FAIL TO LOG MASSIVE AMOUNTS OF HAZ-MAT IMPORTS?

1282.6 KILOTONS

≡

≡

≡

2012

EXPORTS TO IMPORTS of HAZ MATS

1 KILOTON = 1 MILLION GRAMS
1 MEGLITER = 1 MILLION LITERS

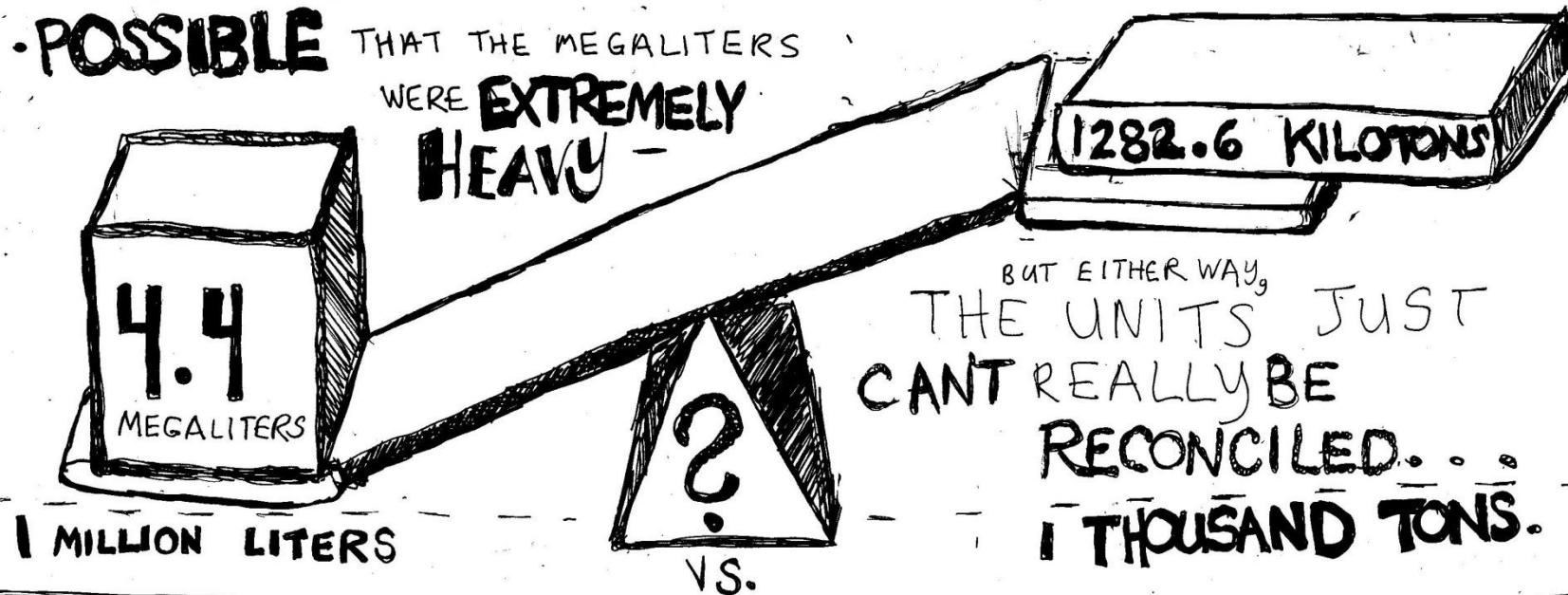
2.25 MEGLITER 31.2 KILOTONS 4.4 MEGLITERS

EXPORT IMPORT
(FROM THE EPA DATA!)

OR WAS THE EPA JUST A LITTLE SLOPPY WHEN RECORD-KEEPING?

HERE'S HOW SOME OF THE IMPORTS COULD HAVE 'SLIPPED THROUGH THE CRACKS.'

- POSSIBLE THAT WHEN THE REMAINDER OF THE DATASET IS DIGITIZED, THE MISSING IMPORT DATA WILL APPEAR
- COULD BE LURKING IN ENTRIES WHICH ARE MISSING DATES.
- POSSIBLE THAT THE MEGALITERS WERE EXTREMELY HEAVY -



THERE ARE LOTS AND LOTS OF OTHER ANALYSES WITH THIS DATASET THAT I WANT TO DO!
AND I CAN DO, WITH SQL! And a little researching on google...

- Who received the most shipments?
- Who received the most super dangerous shipments?
- What was the most common port of entry into the United States?
- What was the most common haz-mat imported into the United States? Does this haz-mat seem to have some kind of 'fit' (is this a really easy haz mat to destroy? is it a really profitable haz-mat to import? etc)
- Which companies are mentioned the most frequently in the data? (and is there anything in the news about these companies and their relationship to the environment / EPA?)
- Who is the biggest domestic importer? Who is the biggest exporter?
- Why was documentation so poor in the years prior to 2012?

I WOULD LIKE TO RELATE THE ANSWERS TO THESE QUESTIONS TO MY FOUR SCENARIOS, WHICH I HOPE TO CENTER AROUND A PARTICULAR LOCATION – PERHAPS THE FACILITY IN DETROIT! And there will be, of course, many other questions which will come up as I continue to work on this dataset! 😊

QUOT HOMINES, TOT SENTENTIAE

THERE ARE AS MANY OPINIONS AS THERE ARE PEOPLE!

-TERENCE, 161 BCE

ReSentences



INTRODUCTION

INFORMATION ON 'DEVELOPED' COUNTRIES CAME FROM THE UN 2014 HUMAN DEVELOPMENT INDEX.

HAZ-MAT INFORMATION WAS EXTRACTED FROM THE WEBSITE OF THE E.P.A.

TERRY TRUCKDRIVER!

TERRY'S SCENARIO USED THE ACCOUNTS OF TRUCKERS FROM SEVERAL WEBSITES:

REALWOMENINTRUCKING | TRUCKINGTRUTH | SMART-TRUCKING | LADYTRUCKDRIVERS | LAYOVER |
LIFEASATRUCKER

I ALSO DREW HAZ-MAT & REGULATORY INFORMATION FROM THE COMMERCIAL DRIVER'S MANUALS OF PENNSYLVANIA AND CALIFORNIA.

^{HAZ-MAT}
ROAD INFORMATION WAS SUPPLIED BY ESRI, WHICH CLAIMED THAT THE DATA HAD BEEN PROVIDED BY THE U.S. DOT. I WAS UNABLE TO LOCATE ANYTHING HIGHER-QUALITY AND FOUND NOTHING FROM THE GOVERNMENT. ESRI PREVENTED ANY MANIPULATION OF THIS DATA, WHICH IS WHY THE ROADS ARE LABELED BY HAND.

HAZ-MAT TRUCKING SALARY IS FROM THE NATIONAL SALARY TREND TOOL.

HAZ-MAT VIOLATIONS ARE FROM THE FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION.



THANKS

AND

ACKNOWLEDGEMENTS!

THIS BOOK WOULD NOT HAVE BEEN CREATED WITHOUT THE WORK OF
HEATHER ROSENFELD, RAFI AREFIN, AND EVAN APPLEGATE WHO
PAINSTAKINGLY DIGITIZED & MANIPULATED THE DATA KEPT IN THE
EPA'S PDF DOCUMENTS.

PROF. ROBERT ROTH AND CARTOGRAPHY LAB DIRECTOR **TANYA BUCKINGHAM**
ORGANIZED THE 2015 DESIGN CHALLENGE, FROM WHICH THIS BOOK WAS
PRODUCED. BOTH CARTOGRAPHERS PROVIDED FORMATIVE FEEDBACK WHICH
SHAPED THIS WORK.

CARL SACK & SARAH BENNETT PROVIDED EXCELLENT ADVICE REGARDING CASE SCENARIOS AND DESIGN.

PROF. SARAH MOORE & THE **MELLON HUMANITIES GRANT**. AND, AS
ALWAYS, **PROF. HEBDO** (LYNDA BARRY).

THIS BOOK IS DEDICATED TO ALL THOSE WHOSE LIVES HAVE BEEN
IMPACTED BY THE U.S. HAZ-MAT TRADE.

CHELSEA NESTEL (VANTH), 2015