

# Ozone in Our School Zone

A GLOBE Project

By Ms. Carter's Science Special Topic's Class

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**Abstract:**

After observing a marked increase in natural gas drilling in our area, we decided to research the effects of natural gas drilling on the ozone at our school. The most noticeable impact of the drilling is an increase in natural gas related traffic. We decided to count number of gas related vehicles driving by our school and compare them with the surface ozone levels at our school. To prepare we researched hydrofracking, atmosphere and ozone, and and discussed ways they could be related and effects on health and the environment. We found a study that is run by a local health department that is sending atmospheric data to West Virginia University and they are studying the health effects of fracking wells on local health. We invited the Doctor to speak to our class and learned more about the possible health effects. We made ozone detection strips

and designed a procedure and data sheets to get data on numbers and ozone levels. We didn't notice any difference in our ozone strips so we were unable to make a conclusion about the effects of the traffic on surface ozone levels. Also as we were researching we found an article that said that vehicles don't actually give off surface ozone but they give off other chemicals that cause the creation of surface ozone so we found that our original hypothesis was flawed from the onset. We became curious about the percentage of traffic that was gas related so we counted all the vehicles for a couple of days. We found that the percentage was much less than we predicted. We predicted 25-40% but our actual results were 9 and 13% Still we thought that was a significant increase in general traffic in our area and the roads are showing the wear and tear. We were very surprised at the number of natural gas related vehicles that were passing our rural school everyday. .07 trucks per minute.

## Research Questions:

- Is there an increase in traffic in our local area?
- Is natural gas traffic affecting our ozone layer?
- Is the increase in traffic of the well trucks affecting people's health?

## Hypothesis:

We think that the increase in the natural gas traffic is increasing the surface ozone.

## Materials and Method:

- **First we have to put the date on the data sheet**
- **Then we put the class period on the data sheet**

- And then we put the persons name on the data sheet to see who counted the trucks that day
- Go outside and have one or two people count the trucks, if two have them work together to make sure they don't miss any
- Have each class go out there and calculate how many gas trucks they see
- And do that for at least three days or so
- When you have collected all of your data add all the medium water trucks and so on and then you should get a total
- Do that for every paper from each class from each day
- Finally add all of the data together to get a complete total
  - When you have the total write that down
  - Do the same project three or four more times
  - When you have a complete total for all four days or how ever many days you did it compare the days and see the difference

### **What to do with the Ozone Strips**

- Cut a piece of a coffee filter into a little strip
- Dip the strip in some water but DON'T touch the wet part
- Go outside and hang it out but not in the sun
- Leave it out there for an hour and a half
- See the results of what happened to the ozone strip
- Leave it out there for an hour and a half
- See the results of what happened to the ozone strip
- After you have looked at the ozone strip compare it to the data of the gas trucks

## Data Summary:

Date	Total Gas Related Vehicles	Non Gas Related Vehicles	Ratio of Gas related to Non Gas related vehicles	Ozone Reading
April 10	178			

Gas Related Trucks/Period

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8	Period 9	Period 10
24	30	18	11	22	25	57		19	30

Total Trucks/Type

Medium Water Trucks	Big Water Trucks	Gravel Trucks	Pickup Trucks	Drillpad Equipment
4	41	57	89	6

Date	Total Gas Related Vehicles	Non Gas Related Vehicles	Ratio of Gas related to Non Gas related vehicles	Ozone Reading
April 15	197	1287	1484 13%	

Gas Related Trucks/Period

Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8	Period 9	Period 10
19	14	46	21	26	10	15	9		10

Date	Total Gas Related	Non Gas Related	Ratio of Gas	Ozone Reading
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	Vehicles	Vehicles	related to Non Gas related vehicles	
April 23, 2013	118			

Gas Related Trucks/Period

Per iod 1	Per iod 2	Per iod 3	Per iod 4	Per iod 5	Per iod 6	Per iod 7	Per iod 8	Per iod 9	Per iod 10
20	3	6	12	14	22	N/A	30	N/A	23

Total Trucks/Type

Medium Water Trucks	Big Water Trucks	Gravel Trucks	Pickup Trucks	Drillpad Equipment
12	10	35	44	17

Date	Total Gas Related Vehicles	Non Gas Related Vehicles	Ratio of Gas related to Non Gas related vehicles	Ozone Reading
May 1	129			

Gas Related Trucks/Period

Per iod 1	Per iod 2	Per iod 3	Per iod 4	Per iod 5	Per iod 6	Per iod 7	Per iod 8	Per iod 9	Per iod 10
28	17	11	15	4	5	4	6	9	

Total Trucks/Type

Medium Water Trucks	Big Water Trucks	Gravel Trucks	Pickup Trucks	Drillpad Equipment
3	25	36	33	31

## Analysis and Results:

We collected data on the number of gas related vehicles going by our school for 4 days and counted the total number of vehicles 2 of those 4 days.

April 10, 2013 – 178

April 15, 2013- 197

April 23, 2013- 118

May1, 2013-129

April 10<sup>th</sup> and May 1<sup>st</sup> were Wednesdays which are shorter days , because we operate on a 1 hour delay schedule

We predicted the percentage of gas traffic would be between 20-40% but actually we found the percentage to be 8% on one day and 13% on another day.

Our ozone strip results showed all normal levels.

## Conclusions:

- There was more truck traffic than we thought we'd have.
- The percentage of natural gas related traffic compared to regular traffic was less than we thought.
- We were not able to conclude if an increase in truck traffic caused the ozone to change.

## Discussion:

There were some problems with our original idea that vehicles gave off ozone and we later found that wasnt true.

We had some problems with finding the proper ozone protocol till later and we werent sure if our results were correct or not.

Everyone was generally intrigued with our project because the amount of traffic and damage to the roads is very noticeable.

Acknowledgments:

References and Bibliography:

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2. Air Quality Data To Be Collected

<http://www.shaleplayohiovalley.com/page/content.detail/id/500311/Air-Quality-Data-To-Be-Collected.html?nav=5024>