TO WHOM IT MAY CONCERN.

THE RIVERMOUTH ACTION GROUP INC has an unlisted web site on fine particle pollution.

Http://www.rag.org.au/air_pollution

It was developed in a result of an application of Caltex (now Ampol) refinery at Lytton in Brisbane clean fuels modification to the refinery with low sulphur fuels.

It describes how long fine particle pollution is suspended in the atmosphere before falling to ground level.

The worst place in South East Queensland to have pollution emitted in in Brisbane's river mouth area.

Exactly where the Brisbane Airport is situated.

Regards

Barry Wilson
Chairperson
The Rivermouth Action Group Inc

Fine Particle Pollution

We all suffer from dust settling within our homes and the constant struggle to de-dust every surface unless a visitor thinks we did not spend time house cleaning for their visit.

No matter how often we dust, sweep and vacuum our house, a fresh layer of dust appears soon after the last layer is removed.

Where does it come from?

The question you really need to ask is, "How far did it come from and who is responsible?"

Who is responsible for polluting our home, our environment and air which we must all breathe.

After making a complaint to the Environmental Protection Agency in Brisbane, Queensland Australia in November 2007 and after two years I was told that a further 12 months was required for more testing I decided to look into the matter further.

Could the industry site I complained about be the culprit 9.6 k away be responsible?

Could their dust emissions travel about 10 k to my home?

I can assure you the the Queensland EPA were right on top of my written complain.

After 2 years they want a further 12+ months to investigate.

With all the years of Environmental licencing, the EPA still does has not enough pollution data to make a decision.

One would have thought if a company was allowed to emit 700 tonnes per year and equipment was available to capture the majority of it that it would be manditory.

Did the EPA (now DERM) have any idea about the fine particle pollution they had approved the 24/7 release of? NO!!!

Just read the EPA letter and judge for yourself: Letter dated 21 Dec 2007

After reading their letter, you may have asked yourself, "since when does a particle have a diameter of 2.5 micro grams" (microns is the correct measurement of fine particle pollution or PM 2.5. Are EPA letters proof read?

When I inquired after 5 months after my formal written complaint I was informed nothing had been investigated as the officer to whom my complaint was refereed to was no longer with the EPA and no investigation had therefore been taken.

Now that two years have passed no sample of dust has been requested nor collected. No dust sampler has been placed at my home, in my suburb or any neighbouring suburb. So much for any EPA investigation to narrow down the polluting industry by chemical analysis.

Furthermore Caltex admitted that none of the particulates which are captured at their closest monitoring station are analyzed for chemical composition.

Caltex emissions can definately be deposited at my residence as it is just a minimal distance away as to just how further their particle

pollution can travel airborne.

How can I justify this claim.

I found a web site which mentions Stokes Law.

Stokes Law: Solve problems related to terminal, fall, and settling velocity, particle diameter and density, density and viscosity of medium (e.g. water, air, oil) and acceleration of gravity.

This interactive web site can be found at:

http://www.ajdesigner.com/phpstokeslaw/stokes_law_terminal_velocity.php

When you input the required information the inbuilt calculator will determine the speed which fine particles descend.

Acceleration of gravity (g) is equal to 9.797 meter/second^2

Found at: http://en.wikipedia.org/wiki/Earth's_gravity

Select a Particle diameter (d) for investigation either 1, 2.5, 5 or even 10 microns or larger. That is one micron is 1 millionth of a metre

Density of Particle (Pp) equals Al2O3 = 2.634 grams/centimetre^3

http://en.wikipedia.org/wiki/Aluminum_oxide

SiO2 = 4 average grams/centermetre^3

http://en.wikipedia.org/wiki/Silicon_dioxide

Density of Air equals (Pm) 1.204 kilograms/meter^3

http://en.wikipedia.org/wiki/Density_of_air

Viscosity of Air equals (u) 0.0001983 kilograms/meter-second

http://www.engineeringtoolbox.com/air-absolute-kinematic-viscosity-d_601.html

Analysis of emissions as supplied:

C Carbon 0.09%

Al2O3 Aluminum Oxide 58.62%

Fe Iron 0.68%

Na Sodium 0.57%

RE Rare Earth Elements 1.63% What are Rare Earth Elements? Microsoft Excel file OR web page Rare Earth Elements

Cu Copper 0.01%

Ni Nickel 0.28%

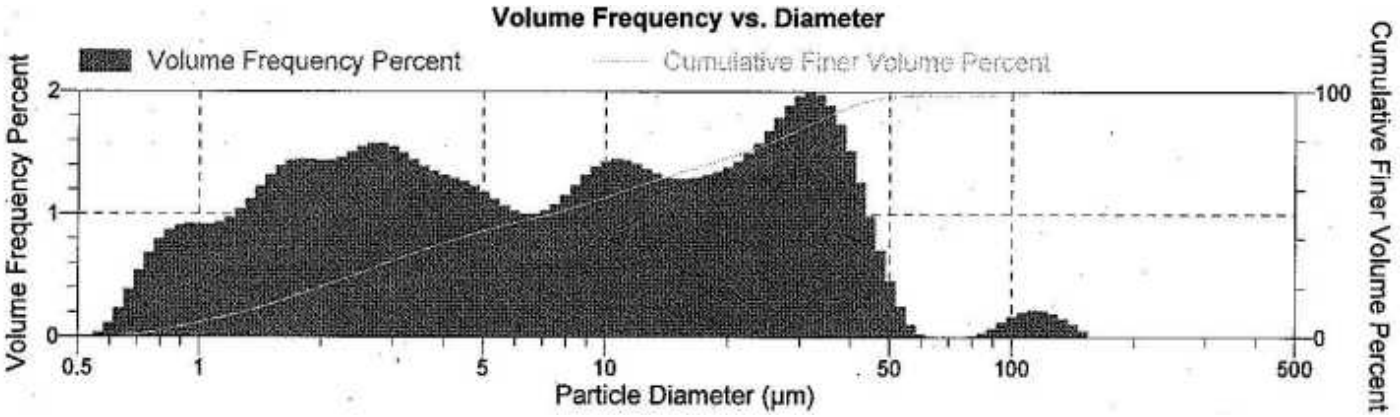
V Vanadium 0.06%

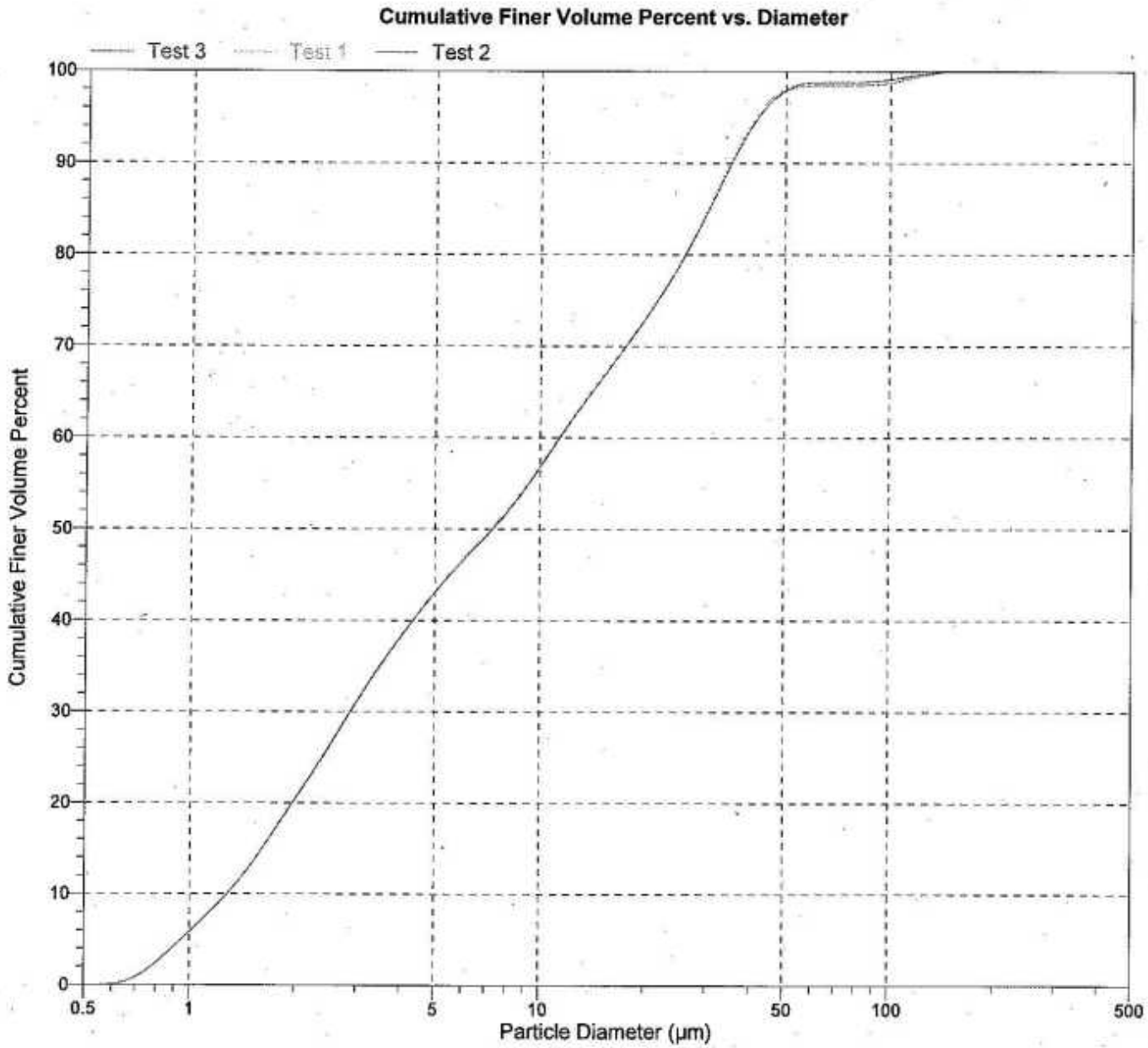
Sb Strontium 0.13%

P2O5 Phosphorus Pentoxide 0.08%

SiO2 Silica 38.35%

What are the particle sizes being emitted?


Volume Frequency vs. Diameter
Volume Frequency Percent
Cumulative Finer Volume Percent
Volume Frequency Percent
Cumulative Finer Volume Percent
2
1
0
100
0
0.5
1
5
10
50
100
500
Particle Diameter (µm)


Cumulative Finer Volume Percent vs. Diameter
Test 3
Test 1
Test 2
Cumulative Finer Volume Percent
100
90
80
70
60
50
40
30
20
10
0
0.5
1
5
10
50
100
500
Particle Diameter (µm)

This is the results for SiO2 at PM2.5 (2.5) microns

"fall, settling or terminal velocity (Vt) = 0.00045164282533479 meter/second"

The time a particle takes to fall 1 metre can be calculated by dividing 1 by the result above. 1 divided by 0.00045164282533479 equals:

2214.139014073185817749763034706 8 seconds per metre or 2214 seconds = 36.9 minutes for a 1 metre fall in height in still air.

It takes a 2.5 micron particle of SiO2 to fall 58.44 metres is about 35.94 hours in still air and if the fall starts from even higher point due to the hot exhaust plume being carried a further possible 10 metres higher, the time would be up to 6.15 hours longer.

With the refinery at 6 m AHD the added time to fall to 0 m AHD (sea level) is 3.69 hr.

Given that the average wind speed for the area (taken from the Bureau of Meteorology web site is 9.00 am daily wind speed average is 15.3 k/hr and at 3pm daily average 21.2 k/hr over a one year average. Averaged am and PM that is. 15.3 + 21.2 = 36.5/2 = 18.25 km/hr and converted to metres per second that is 5.069444444444445.

Historical wind speeds for the past 20 years
http://www.bom.gov.au/climate/averages/tables/cw_040842.shtml

9 am yearly historical wind rose for Brisbane Airport:
ftp://ftp.bom.gov.au/anon2/home/ncc/cdo/windrose/WR_040842_9am.pdf

3 pm yearly historical wind rose for Brisbane Airport:
ftp://ftp.bom.gov.au/anon2/home/ncc/cdo/windrose/WR_040842_3pm.pdf

Now lets look at how far a 2.5 micron particle could travel if released into a constant 20 deg C air flow at 18.25 km per hour.

With the stack height of 58.44 m. It could take 35.94 hours to fall to 6 m AHD. The refinery is at 6 metres AHD adding a further 3.69 hr. to sea level. If the hot air plume caused to particle to rise a further 10 m it would add a further 6.15 hours = 45.78 hr.

In a breeze of 18.25 k/h and a discharge height of 58.44 m + 6 m + 10 m= 74.44 m the time it may take a particle of PM 2.5 to fall to sea level is 45.78 hr. the distance could be 835.485 kms.

Its only 754 kms from Caltex Kurnell Refinery south of Sydney to the Caltex Lytton Refinery in Brisbane as the Crow flies.

As further calculation are carried out on other particle sizes and different pollution types in different wind speeds it is not hard to see just how much Caltex could be responsible for your dusty homes.

A 2.5 micron particle of Al2O3 takes 1457.782877570096798586742258 4717 seconds to fall 1 metre. That is 1457.78 seconds = 24.3 minutes per metre. Therefore with a drop of 6 m AHD + 58.44 m exhaust stack + 10 metres higher in exhaust plume= 74.44 m there the time to drop to 0 AHD = 1808.6 minutes = 30.14 hours.

Distance of travel to fall to 0 AHD is 30.14 hours at 18.25 km/hr = 550 kms.

A 1 micron particle falls at 9111.142984813503453214289736342 9 sec/m or 2.53 h per metre and the height of fall to sea level of 74.44 m would take 188.398 hr..

At 18.25 k/h for 188.3 hours = 3436.475 kms. Which is about from Lytton in Queensland to Albany in WA or into the Indian Ocean off Broome, WA.

Brisbane experiences afternoon sea breezes which are easterly and early morning breezes which are westerly. Thus this pollution is moved with the wind back and forth across Moreton Bay, Bay Islands and the city of Brisbane and neighboring cities and towns depending on wind strength and wind direction until it eventually all deposits in your homes, on your car or on your house etc. almost where ever you live in SE Queensland.

We hope that you are convinced that the particles can reach at least to your home I would like to mention the common name for particles of size 2.5 microns and smaller, that is Ultrafines.

There are many medical studies and warnings about breathing in such particles and how they shorten lives. (Many reports available via e-mail upon request)

I presently have a two year complaint with DERM, a current complaint to the Queensland Ombudsman and with the Director General of DERM. A previous complaint to the Premier via her web site this year was forwarded to DERM. A lot of good that did!

Now it is time for you to inform yourself and family, tell your neighbors and friends and make a complaint to the DERM and local member and maybe the Premier.

Maybe we can all contact Woolworth and ask them why they continue to have a partnership with a polluting industry.

Now is the time to ACT!!

Barry Wilson
Chairperson
The Rivermouth Action Group Inc

This entire web site (air pollution) is a Draft web page which still to be peer reviewed for any mistakes.

The information I have used in the preparation of this document I am willing make available to interested members of the local Community.

10 micron Al2O3 (Aluminum oxide) via Stokes Law particle drops 0.010975571359892 m/sec

1/0.010975571359892 = 91.111429848135034532142897363429 sec/m

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These calculations for Al2O3 use these figures:

acceleration of gravity (g) = 9.797

particle diameter (d) 1 micron to 60 micron

density of particle (?p) = 4

density of medium (?m) = 1.204

viscosity of medium (μ) = .00001983

Gives the following results just dropping from the height top of the exhaust chimney without any allowance for increased height of release due to the hot air plume:

1 micron drop 1 metre in 9111.14298481 sec and 147.90 hours to drop 58.44 metres and 115.66 hours to drop 45.7 metres

2 micron drop 1 metre in 2277.7857462 sec and 36.97 hours to drop 58.44 metres and 28.91 hours to drop 45.7 metres

3 micron drop 1 metre in 1012.34922053 sec and 16.43 hours to drop 58.44 metres and 12.85 hours to drop 45.7 metres

4 micron drop 1 metre in 569.4464365508 sec and 9.24 hours to drop 58.44 metres and 7.22 hours to drop 45.7 metres

5 micron drop 1 metre in 364.445719392 sec and 5.91 hours to drop 58.44 metres and 4.62 hours to drop 45.7 metres

6 micron drop 1 metre in 253.0873051 sec and 4.10 hours to drop 58.44 metres and 3.21 hours to drop 45.7 metres

7 micron drop 1 metre in 185.94169356761 sec and 3.01 hours to drop 58.44 metres and 2.36 hours to drop 45.7 metres

8 micron drop 1 metre in 142.3616091 sec and 2.31 hours to drop 58.44 metres and 1.80 hours to drop 45.7 metres

9 micron drop 1 metre in 112.48324672608 sec and 1.82 hours to drop 58.44 metres and 1.42 hours to drop 45.7 metres

10 micron drop 1 m in 91.1114298 sec and 1.47 hours to drop 58.44 metres and 1.15 hours to drop 45.7 metres

20 micron drop 1m in 22.7778574 sec and 22.18 minutes to drop 58.44 metres and 17.34 minutes to drop 45.7 metres

30 micron drop 1m in 10.123492 sec and 9.86 minutes to drop 58.44 metres and 7.71 minutes to drop 45.7 metres

40 micron drop 1m in 5.6944643 sec and 5.54 minutes to drop 58.44 metres and 4.33 minutes to drop 45.7 metres

50 micron drop 1m in 3.6445719 sec and 3.54 minutes to drop 58.44 metres and 2.77 minutes to drop 45.7 metres

60 micron drop 1m in 2.53087305 sec and 2.46 minutes to drop 58.44 metres and 1.92 minutes to drop 45.7 metres

For a 60 micron particle to drop the extra 10 m from plume height would be 2.53 sec x 10 m = 25 sec and therefore a total of 2 min 52.6 sec to descent to 6 m AHD

Km per hour wind speed	Time taken to travel 1.4 km	Meters per second
1	1.4 hr	0.2777778
2	42 minutes	0.5555556
3	28 min	0.8333333
4	21 min	1.111111
5	16.8 min	1.388889
6	14 min	1.666667
7	12 min	1.944444
8	10.5 min	2.222222
9	9.3 min	2.5
10	8.4 min	2.777778
11	7.63 min	3.055556
12	7 min	3.333333
13	6.46 min	3.611111
14	6 min	3.888889
15	5.6 min	4.166667
16	5.25 min	4.444444
17	4.94 min	4.722222
18	4.77 min	5
19	4.42 min	5.277778
20	4.2 min	5.555556

Caltex has two FCCU exhaust stacks. One at 58.44 m and the other 45.7 m

The lower of Caltex's exhausts is 45.7 m above ground which is 6 m AHD that is 51.7 m above AHD.

The high point of North Point is 31 m AHD ground height plus living space at say 3 m higher making 34 m leaving a difference of 17.7 m plus 10 m plume flow release at 27.7 m.

If a 10 micron particle of takes about 42.06 minutes to drop 27.7 metres it would require only a wind speed of 2 km per hour to deposit 1.4 km away at Constellation Way.

Take into account that the dust monitor at Nazareth House is at 38.7 metres AHD and the plume rises maybe 10 to 20 metres above emission point in low wind speeds the PM 10 particles would be still airborne passing over the local dust monitor at Nazareth House along with all of the finer particles.

If the wind was at 12.75 km per hour and a 10 micron particle was released from the plume 10 metres above the shortest exhaust it could travel 1.7 km to a point over the highest land point of Nazareth House at a height of about 1 metre without depositing within 8 minutes of release from Caltex and would not deposit for about 16.7 km (depending on AHD levels) south of the release point without disruption somewhere between the Leslie Harrison at Dam Burbank and 5 km south.

All calculations used are in the public interest and are no meant to be a scientific certainty because of air temperature (calculation made at 20C where possible) changes nearly hourly, wind speed and direction continually change and undulating topography alter air flows.

Caltex Refinery Emissions Lytton Brisbane Queensland.

NPI web site http://www.npi.gov.au lists Caltex refinery emissions for the year 2007 including particulates at:

http://www.npi.gov.au/cgi-bin/npireport.pl?proc=facility_report;instance=public;year=2008;loc_type=state;loc_state=QLD;jur_fac_id=5353#Emissions

83% of the emissions of the total PM10 particles of 380 tonnes per year appear to be attributed to the FCCU equipment at (315.4 tonnes).

Particles with an average diameter of PM 2.512 or less is 26.6% by volume of 315.4 tonnes therefore possibly: 83.8964 tonnes per year = 229.8531 kg per day of ultrafine or near ultrafine particles from the FCCU into Brisbane's airshed from Caltex refinery Lytton

Plus the reported 28,000 kgs per year of PM2.5 particles produced by combustion adds the daily total by 76.71 kgs with a combined possible total of 306.5631 kg per day of ultra fine or near ultrafine particulates into Brisbane's airshed.

The total particle emission appear to be near the total allowed of 700 tonnes per year which could amount to near 1.9 tonnes per day into Brisbane's airshed of Caltex emissions.

Now that you can be assured Caltex emission can actually make it into your home and your lungs and deposit anywhere you live in Brisbane and surrounds it is up to you to make the effort to lodge your own complaints with Caltex and DERM.

More calculation to be added.

Other calculation for Al2O3 and SiO2 and verification

http://www.caltex.com.au/assets/community/Caltex_environment_policy.pdf