B1 (5 pgs)

Gao, Frank F. (DNREC)

From: Alan Muller <amuller@dca.net>
Sent: Thursday, September 11, 2014 3:35 PM
To: Haynes, Robert P (DNREC)
Cc: Gao, Frank F. (DNREC); Mirzakhalili, Ali (DNREC)
Subject: RE: request for transcript and holding record open.... fuel vapor recover

Bob:

This not responsive to my request. Unless the statute has changed, DNREC public hearing are on the record. It has been my experience that reporting services provide transcripts when required by the customer. Is the Department intentionally obstructing public participation by withholding transcripts and setting short deadlines? I repeat my request, below, that the record be kept open for one week AFTER the transcript has been made available.

Yours very truly,

Alan Muller

At 07:28 PM 9/10/2014 +0000, Haynes, Robert P (DNREC) wrote:

Dear Mr. Muller:

No transcript for this one too, but it will be sent to you when I get it. The public comments were mostly from regulated industry. Contact Frank Gao for any information on the proposed reg?s scientific support etc
From: Alan Muller [mailto:amuller@dca.net]
Sent: Wednesday, September 10, 2014 3:15 PM
To: Haynes, Robert P (DNREC)
Cc: Mirzakhalili, Ali (DNREC); amywroe@gmail.com
Subject: request for transcript and holding record open.... fuel vapor recover

Dear Mr. Haynes:

I understand you recently held a public hearing on gas station vapor recovery issues and the record on this matter is due to close this Friday.

This issue has been of interest to Green Delaware for many years and we desire to submit well-informed comments.

For this purpose I request the transcript of the hearing as soon as possible.

It would be appropriate for the transcript to be available at least a week before closing of the record, to give us and other members of the public an opportunity to review it and submit well-informed and useful comments.

For this reason we request that the record be held open until at least one week, and preferably two, after the transcript has been made available. It would be appropriate for the transcript to be posted with the Department's other materials on this proceeding. My understanding is that the proceedings contains no deadlines incompatible with this request.

If this request raises any questions please feel free to contact me.

Yours very truly,

Alan Muller

Alan Muller, Executive Director
Green Delaware
Box 69
Port Penn, DE 19731 USA
302.834.3466
cell 302.299.6783
greendel@dca.net
www.greendel.org

Gao, Frank F. (DNREC)

From: Haynes, Robert P (DNREC)
Sent: Wednesday, September 17, 2014 11:45 AM
To: Mirzakhalili, Ali (DNREC); Alan Muller
Cc: Globetti, Michael J. (DNREC); Gao, Frank F. (DNREC); Fees, David F. (DNREC); Amirikian, Ronald A. (DNREC)
Subject: RE: Re-opening public comment period for additional written public comments

Dear Mr. Muller and Director Mirzakhalili

The request to re-open the record is granted for supplemental public written comments on the proposed regulation. It will begin now and end **Monday 4:30 pm October 6, 2014**. DAQ is to 1) prepare and have published legal notices for the Sunday newspapers, 2) prepare a list of contacts for all interested participants and contact them directly based upon the contact information that was provided; ie email if that is what was provided, and 3) assist Public Affairs with a press release. The supplemental public comments should be directed to the DAQ person identified in the original public notice.

While I grant a re-opening of the public comment period for supplemental written comments, it is based upon Secretary's Small's decision to hear additional public comments from those who may not have commented given the extent of the public interest in this matter, although anyone may submit comments. The Muller's request stated as a reason the opportunity to respond to public comments, but the purpose of public comments is to comment on the proposed regulation and not on other public comments, which could result in a cycle of comments and reply comments.

Sincerely,

Robert P. Haynes, Esq.
Senior Hearing Officer
Office of the Secretary
Delaware Department of Natural Resources and Environmental Control
89 Kings Highway
Dover DE 19901
Tel. 302 739-9039
Fax 302-739-6242

From: Mirzakhalili, Ali (DNREC)
Sent: Tuesday, September 16, 2014 8:39 AM
To: Alan Muller; Haynes, Robert P (DNREC)
Cc: amywroe@gmail.com
Subject: RE: request for transcript and holding record open.... fuel vapor recover

The decision is the hearing officer's to make.

Thanks,

Ali

From: Alan Muller [mailto:amuller@dca.net]
Sent: Monday, September 15, 2014 2:47 PM
To: Mirzakhalili, Ali (DNREC); Haynes, Robert P (DNREC)
Cc: amywroe@gmail.com
Subject: RE: request for transcript and holding record open.... fuel vapor recover

Thank you, Ali.

I have not received a response from Hearing Officer Haynes on my multiple requests for holding the record open. What is the status of this?

Best,

Alan Muller
Green Delaware

At 04:11 PM 9/15/2014 +0000, Mirzakhalili, Ali (DNREC) wrote:

The transcript is now available online at DAQ?s web page:

http://www.dnrec.delaware.gov/Air/Pages/StageIIVR.aspx

From: Alan Muller [mailto:amuller@dca.net]
Sent: Wednesday, September 10, 2014 3:15 PM
To: Haynes, Robert P (DNREC)
Cc: Mirzakhalili, Ali (DNREC); amywroe@gmail.com
Subject: request for transcript and holding record open.... fuel vapor recover

Dear Mr. Haynes:

I understand you recently held a public hearing on gas station vapor recovery issues and the record on this matter is due to close this Friday.

This issue has been of interest to Green Delaware for many years and we desire to submit well-informed comments.

For this purpose I request the transcript of the hearing as soon as possible.

It would be appropriate for the transcript to be available at least a week before closing of the record, to give us and other members of the public an opportunity to review it and submit well-informed and useful comments.

For this reason we request that the record be held open until at least one week, and preferably two, after the transcript has been made available. It would be appropriate for the transcript to be posted with the Department's other materials on this proceeding. My understanding is that the proceedings contains no deadlines incompatible with this request.

If this request raises any questions please feel free to contact me.

Yours very truly,

Alan Muller

Alan Muller, Executive Director
Green Delaware
Box 69
Port Penn, DE 19731 USA
302.834.3466
cell 302.299.6783
greendel@dca.net
www.greendel.org

Blank page.

B2 (4 pgs)

Comments on CPM – Continuous Pressure Monitoring

Ted Tiberi, Luke Howard
ARID Technologies, Inc.
12 September 2014

Background

DNREC has proposed regulatory language for Delaware GDF whereby foregoing installation of or decommissioning Stage II Vapor Recovery systems can be allowed in exchange for the GDF installing and operating a Continuous Pressure Monitoring (CPM) system. By ensuring a vapor tight site and closely monitoring combined storage tank ullage pressure, environmental benefits are realized as emissions can be reduced and operational savings are generated since the GDF can accumulate fuel savings. If a Non Stage II GDF shows excessive storage tank pressure, a vapor processor may be required to adequately reduce storage tank emissions.

The primary elements of the CPM system include the measurement and monitoring of a vapor leak rate and combined ullage storage tank pressure. Specifically, the vapor leak rate should be less than 2 times the allowed rate from California Air Resources Board (CARB) TP-201.3, updated 26 July 2012. In addition, the tank pressure must be less than 0.5 inches water column below the positive cracking pressure of the P/V valves for at least 95% of the time, evaluated on a weekly basis.

DNREC's Air Quality Group has further proposed that existing commercial ISD (In Station Diagnostics) systems already certified on a specific California Stage II vapor recovery system (described in CARB's Executive Order VR-202-P) using a Healy vacuum assisted system be approved to participate in meeting the needs for Delaware GDF continuous pressure monitoring systems. As such, only two vendors, hold ISD Certification on VR-202-P, Veeder-Root and Franklin Fueling. It should also be noted that CPM systems do not require the full capability of full-fledged ISD systems.

ARID Comments

Technical & Commercial Basis

ARID Technologies, Inc. has over 21 years of experience in GDF vapor recovery, and we have worked closely with CARB personnel on many vapor recovery related issues; having received CARB Executive Order G-70-209 on our PERMEATOR system. The Permeator is a membrane based vapor processor that contains collected vapors and reduces storage tank emissions by actively managing pressure. ARID has installed over 500 Permeator systems, worldwide, and one of our largest customers, Wawa, operates 7 sites in Delaware equipped with Permeator. In

addition, Wawa operates 145 Permeator systems throughout their network of GDF in the Mid Atlantic States. (In the DAQ Questionnaire, Wawa reports average fuel savings from Permeator installed at their Delaware sites of 25 gallons of liquid gasoline per day; this is equivalent to about 750 gallons of fuel per month saved per site.) It is interesting to note that the very high throughput Sunoco site along the Delaware Turnpike (US Route 95) has been equipped with an ARID Permeator since 2009. We estimate Sunoco's savings are at least 750 gallons per month; we have conducted detailed studies for Sunoco's Mr. Terry Rossfelder which show savings rates in excess of 2 gallons of fuel saved per 1,000 gallons of gasoline dispensed. In addition to the site in Newark, Delaware, Sunoco employs ARID's PERMEATOR at high volume sites located along the PA Turnpike (Hunker, PA; located at the "New Stanton Exit"; and King of Prussia, PA). ...And at high throughput sites in West Chester, PA and Jefferson Valley, NY – the Permeator in West Chester has been operating since 2007.

For pressure monitoring, ARID has supplied our ARIDAS-150 (ARID Data Acquisition System) for continuous pressure monitoring for over 10 years. Notable uses include generating raw data for a NHDES and UNH (New Hampshire Department of Environmental Services and University of New Hampshire) joint study on storage tank pressure profiles related to below grade vapor emissions at Cumberland Farms sites located in New England. Our ARIDAS system was also used to collect important data as part of a "Federal Way Study" in Washington State. Lately, our ARIDAS gear is being used to quantify vapor growth rates at Non Stage II GDF in domestic and International GDF locations)

In addition to our CARB and practical field experience, we have reached out to DNREC Air Quality personnel, sharing field data, technical studies and visiting Delaware on 21 February 2013 for an extended presentation to staff. We are eager to discuss our findings in an effort to help derive practical, cost-effective solutions for GDF owners and operators; many of these Stakeholders are already our customers.

From a technical standpoint, we realize that the leak decay protocol and equations shown in TP-201.3 were developed many years ago in California for Stage II GDF; where the assumption is made that the storage tank ullage spaces have hydrocarbon concentrations which are at or near equilibrium (or saturation) and that no significant vaporization is occurring within the storage tanks.

As a practical matter, some doubts remain relative to theTP-201.3 protocol being used for the accurate calculation of leak rates from GDF operating without Stage II vapor recovery; i.e. Non Stage II GDF. Of particular note, the two ISD systems approved by DNREC and described in CARB EO (Executive Order) VR-202-P are used on a Healy Stage II Vacuum Assisted System. The dynamics and typical pressure profiles within the storage tank vapor space for this Stage II system are different than the dynamics within the storage tank headspace for a Non Stage II GDF. Correspondence with CARB personnel confirms this point.

We provide a series of recommendations as follows:

(1.) An accurate leak decay calculation for a Non Stage II GDF must take into account the significant vapor growth rate caused by air ingestion during busy pumping periods. As such, ARID proposes that DNREC, in addition to allowing systems meeting the requirements of VR-202-P, also allow CPM systems, which are approved under TP-201.7 for use at Delaware GDF. This Test Procedure is referred to as "Continuous Monitoring Systems" by CARB and summarizes key elements of the hardware and data collection and transfer. In this manner, gross leaks are easily identified and possible complications arising about the suitability of TP-201.3 can be mitigated, while at the same time allowing Delaware GDF to choose from additional, cost-effective suppliers. We note the recently revised 36.5.1, which suggests that other systems besides those certified under VR-202-P may be allowed.

This approach allows Delaware GDF to quickly implement a practical CPM system that readily identifies gross leaks and other vapor containment system anomalies. For Certification testing on TP-201.7, the CARB Executive Officer pre-approves the CPM prior to installation, and the CARB Executive Officer also approves of the methods used for retrieval and export of the data. Systems meeting TP-201.7 are fully vetted by CARB.

(2.) Allow CPM suppliers to propose their own hardware and software, independent of VR-202-P that carries a 3rd party approval for meeting the leak rate and pressure monitoring criteria outlined by DNREC. The 3rd party can be CARB or another credible source, with suitable technical credentials.

(3.) In addition to the daily and monthly reporting which includes a weekly assessment and possible warning on a weekly basis, ARID proposes that DNREC request **instant notification** of gross leaks or excessive tank pressure. The instant notification could come in the form of emails or other alerts sent by the CPM system.

The gross leak might be identified by quantifying the % time that tank pressure is measured at zero differential pressure (for example, +/- 0.25 inches H2O), and the gross pressure failure could include quantifying the % time that tank pressure is at the positive and/or negative cracking pressure of the P/V valve. We introduce the concept here and leave the details to DNREC Air Quality and the Stakeholder Committee. Identification of such gross failures is "low hanging fruit" and yields significant benefits since anomalies can be quickly addressed as opposed to being uncovered up to 7 days after initial occurrence with a weekly reporting protocol.

(4.) ARID asks to be included in the distribution list for information and notices sent to the "Stakeholder Committee". (please use ttiberi@aridtech.com) . Although our company appears on the "Stakeholder" list (updated June 2014) on the DNREC

Stage II webpage, we never received notification of the Stakeholder Committee meetings and we have not been receiving periodic updates from DNREC.

(5.) ARID asks DNREC to consider a reduced physical inspection/test frequency for GDF that exhibit consistent and passing pressure and leak rate profiles.

(6.) For GDF which adopt the use of a vapor processor to reduce the storage tank pressure, ARID asks DNREC to consider designating such GDF as "Green Gas Stations (GGS)", utilizing state of the art technology. Perhaps designation as a GGS can help differentiate the GDF with physical placards and/or various financial incentives such as reduced tax rates on motor fuel sold at the GGS site. Perhaps DNREC can maintain an updated published list of GGS sites on their website for review by motorists.

(7.) While discussing approval protocol, ARID asks DNREC to consider allowing us to install and operate our CPM at GDF sites in Delaware as part of a field test. At least one GDF owner has indicated strong interest in generating actual data from a Non Stage II GDF operating in Delaware. We seek this approval to generate the raw data on a seasonal basis from a 24/7 Non Stage II GDF operating in Delaware. Concurrent with this demonstration, ARID will be seeking formal approval for use of our gear according to 1 or 2, above.

(8.) ARID asks DNREC to allow GDF owners/operators to continue to use Stage II vapor recovery systems; if they so desire. In conjunction with the continued use of Stage II systems, DNREC can allow so-called ORVR compatible technology to be employed. The CARB website lists equipment which has received Executive Orders for ORVR compatible specifications. GDF owners/operators should be able to weigh their options and make their own business and environmental decisions on Stage II and vapor processors; consistent with established regulatory norms. The CARB link for the ORVR Compatible approvals is http://www.arb.ca.gov/vapor/eo-ORVR.htm

ARID appreciates the opportunity to share practical insights for assisting DNREC and GDF owner/operators in formulating plans and then implementing innovative, efficient and cost-effective solutions for minimizing vapor emissions while at the same time saving fuel.

Please contact us if you would like any additional information.

Sincerely,

Ted Tiberi, President & Founder
ttiberi@ARIDtech.com
Luke Howard, Vice-President Engineering
lhoward@ARIDtech.com

630.681.8500

B3 (2 pgs)

Delaware Chapter of the Sierra Club

Our office: 100 West 10th Street, Suite 106 • Wilmington, DE 19801
Please send mail to: PO Box 5035 • Wilmington, DE 19808
(302) 468-4550 • http://delaware.sierraclub.org

September 12, 2014

Ali Mirzakhalili
Director, Division of Air Quality
Department of Natural Resources and Environmental Control
State of Delaware

Re: Draft Amendments to Regulation 1124 Section 36.0 "Stage II Vapor Recovery"

By email:

Dear Mr. Mirzakhalili,

The Delaware Chapter of the Sierra Club submits the following comments on the Draft Amendments to Regulation 1124 Section 36.0 "Stage II Vapor Recovery" and Vapor Emission Control at Gasoline Dispensing Facilities

Stakeholder Involvement:

The Division of Air Quality maintains that they engaged in a "stakeholder" process, but they limited their engagement largely to the proprietors of gas stations and the petroleum industry. On August 29, 2013 we made recommendations for advocacy groups and health professionals that could assist in a true stakeholder process, but David Fees and Frank Gao dismissed this recommendation outright. This act is offensive to the process of stakeholder involvement and uses rhetoric to provide legitimacy to a process dominated by special interests. We ask that that any stakeholder process engaged by the Department make a meaningful effort to be inclusive, not exclusive.

Air Quality Monitoring:

Throughout the state there are instances where homes, schools or parks are directly adjacent to the location of gas stations. Such inadequate and insufficient air quality monitoring at gas stations is included in the draft regulations that the impact of the regulations on public health cannot be evaluated. No regulations should be adopted without on-site ambient air monitoring for volatile organic compounds, as well as monitors at each tank and at each point of emissions.

Mechanisms should be included in the regulations to restore State II vapor recovery if emissions increase or if air quality erodes.

Socio-Economic Impacts on Stage II Recovery:

The regulations assume that the distribution of new cars with onboard vapor recovery systems is equal. However, this assumption does not account for real data about the prevalence of onboard vapor recovery systems at each gas station. The new regulations, if adopted, will disproportionately impact low-income communities where cars tend to be older and preceded the practice of onboard vapor recovery. No regulations should be adopted without mechanisms to ensure that the local air quality in all communities will not be adversely harmed.

Clearly, we have identified serious flaws with the regulations and the process for regulatory revision that we ask to be addressed by your office.

Respectfully submitted,

Amy Roe, Ph.D.
Conservation co-chair
Delaware Chapter of the Sierra Club

cc.
David Fees
Frank Gao

B4 (46 pgs)

Admin Code 1124 Sect. 36.0. nents to Hearing Records

Gao, Frank F. (DNREC)

From: Gao, Frank F. (DNREC)
Sent: Tuesday, September 30, 2014 8:27 AM
To: Fees, David F. (DNREC); Ted Tiberi
Cc: Haynes, Robert P (DNREC)
Subject: RE: Proposal to Monitor Pressure at a GDF

Hi Ted,
We will enter your correspondence of 9/18, 9/22, 9/23, 9/27 (3) to the hearing records.

Hi Bob,
I will forward to you the correspondences from ARID Technologies, Inc. for the hearing records for the revision to 7 DE Admin Code 1124 Section 36.0 "Stage II Vapor Recovery" (the hearing was held on 08/28/2014). Please see Mr. Tiberi's request below.

Thanks,

Frank

From: Fees, David F. (DNREC)
Sent: Monday, September 29, 2014 11:25 AM
To: Ted Tiberi
Cc: Gao, Frank F. (DNREC); Amirikian, Ronald A. (DNREC); Jacobs, Michelle V. (DNREC); luke howard
Subject: RE: Proposal to Monitor Pressure at a GDF

Ted,

Thanks for your comments, which we will submit to the hearing officer to be entered into the record. We are evaluating all comments in preparing our response to the hearing officer. If you would like to submit the pressure data from the Wawa sites in Delaware, please submit them to Frank or me by close of business on October 6th.

Dave

David F. Fees, P.E.
Managing Engineer
Emission Inventory Development Program
Division of Air Quality, DNREC
tel. (302) 739-9402, fax (302) 739-3106
e-mail: david.fees@state.de.us

Blue Skies Delaware; Clean Air for Life

From: Ted Tiberi [mailto:ttiberi@aridtech.com]
Sent: Monday, September 29, 2014 10:22 AM
To: Fees, David F. (DNREC)
Cc: Gao, Frank F. (DNREC); Amirikian, Ronald A. (DNREC); Jacobs, Michelle V. (DNREC); luke howard
Subject: Re: Proposal to Monitor Pressure at a GDF

Hi Dave,

Thanks for your latest note. My response attached. I look forward to your reply.

Frank, please enter all of my recent correspondence as part of our "Public Comments" into the record on this matter. (9/18, 9/22, 9/23, 9/27 (3))

Thanks and Best Regards, Ted

Ted Tiberi
ARID Technologies, Inc.
323 S. Hale Street
Wheaton, IL 60187 USA
office: 630.681.8500
mobile: 708.557.0297
ttiberi@ARIDtech.com

On Sep 27, 2014, at 8:04 PM, Fees, David F. (DNREC) wrote:

Ted,

You misunderstand the reasons for monitoring pressure. The purpose for Delaware requiring continuous pressure monitoring is to ensure the vapor system does not exceed the acceptable leak rate as provided for in the proposed regulation. In addition, The CPM will monitor pressure to determine when venting is occurring to determine if venting exceeds the allowable time set in the proposed regulation. CPM can accomplish these determinations on either a Stage II or Stage I only GDF.

Regards,

Dave

From: Ted Tiberi [ttiberi@aridtech.com]
Sent: Saturday, September 27, 2014 12:15 PM
To: Fees, David F. (DNREC)
Cc: Gao, Frank F. (DNREC); Amirikian, Ronald A. (DNREC); Jacobs, Michelle V. (DNREC); luke howard
Subject: Re: Proposal to Monitor Pressure at a GDF

Hi Dave,

Thanks for your latest note.

For the 7 Wawa stations in Delaware with PERMEATOR units, we have been recording and storing pressure data since 2005 (Claymont, DE; first site installed). We have an extensive data set on Stage II pressure profile, as a function of ORVR penetration, and with and without PERMEATOR operation. However, it seems to me that the current focus is on Non-Stage II pressure profiles, as evidenced by the comments made by Stakeholders at your recent Public Hearing.

Since the fundamental dynamics of pressure vs time are much different for Stage II vs. Non Stage II systems, it seems that CPM testing on Non Stage II GDF would be much more appropriate. With a ready-made situation to generate actual data from Non-Stage II GDF in Delaware, and since the viability of CPM depends so strongly

on the actual tank pressure performance of Non Stage II GDF, and since we have a willing and ready GDF volunteering to make such tests, why would Delaware delay in expediting a favorable decision to proceed with such data gathering ? Data gathering on Non Stage II GDF is the key to quantifying the storage tank emissions, calculating the associated fuel savings and determining the ultimate viability for CPM and possible pressure management hardware.

Can you please clarify your reluctance to rapidly move forward with a data gathering effort for Non Stage II GDF in Delaware ?

Best Regards, Ted

Ted Tiberi
ARID Technologies, Inc.
323 S. Hale Street
Wheaton, IL 60187 USA
office: 630.681.8500
mobile: 708.557.0297
ttiberi@ARIDtech.com

On Sep 26, 2014, at 11:03 AM, Fees, David F. (DNREC) wrote:

Ted,

I received word from Frank Gao that you are interested in monitoring pressure at a GDF in Delaware with Stage II turned off. Since you are seeking to read pressure, and since we are not able to allow Stage II to be turned off without providing for some type of enforcement discretion, we would ask that you test your pressure monitoring system with the GDFs as they are currently configured. We have always wondered why no pressure data were recorded for the systems that are already in place at the 7 Wawa stations in Delaware.

Regards,

Dave

David F. Fees, P.E.
Managing Engineer
Emission Inventory Development Program
Division of Air Quality, DNREC
tel. (302) 739-9402, fax (302) 739-3106
e-mail: david.fees@state.de.us

Blue Skies Delaware; Clean Air for Life

Blank page.

Gao, Frank F. (DNREC)

From: Gao, Frank F. (DNREC)
Sent: Tuesday, September 30, 2014 8:39 AM
To: Haynes, Robert P (DNREC)
Cc: Ted Tiberi (ttiberi@ARIDtech.com); Fees, David F. (DNREC)
Subject: Arid comment 1-FW: Vapor Containment Emissions Reductions and Associated Economics
Attachments: Vapor Containment Economics No Stage II Case 18 SEPT 2014 ARID TECH.xlsx

Bob,
Here is ARID comment 1 of 09/18/2014. Please note that there is an attachment to this e-mail. Thanks,
Frank

From: Ted Tiberi [mailto:ttiberi@aridtech.com]
Sent: Thursday, September 18, 2014 6:23 PM
To: Gao, Frank F. (DNREC)
Cc: Fees, David F. (DNREC); Amirikian, Ronald A. (DNREC); luke howard; Jacobs, Michelle V. (DNREC)
Subject: Vapor Containment Emissions Reductions and Associated Economics

Dear Frank and DNREC Team,

I reviewed your note on cost effectiveness of pressure management technology which was updated on 28 AUG 2014.

I have attached a spreadsheet, noting the following:

- I compared your "test case" of 3, 10,000 gallon tanks, half full at pressure increase of 1 " WC per hour, venting interval of 1.2 hrs/day with the data set I previously submitted to DNREC (powerpoint graphs, actual field data from Non Stage II site)
    - Our data had 3, 30,000 gallon tanks, half full at pressure increase of 1 " WC per 10 minute interval, and venting interval of 3.84....and 6 hours per day.
- Typically, we use a gasoline vapor MW of 66 and specific volume of 386 ft3/lb-mol for these types of calculations
    - I ran 3 "Cases"
        - MW = 66 & 386 ft3/lb-mol
        - MW = 114 & 386 ft3/lb-mol
        - MW = 114 & 285 ft3/lb-mol (DNREC Case: your molecular weight seems high for vapor phase; did you perhaps choose the molecular weight of liquid phase gasoline ?)
- For Captial Amortization, I used your same conditions: $12,000 for carbon adsorption, 20 year life, and 7% interest rate ($1,132.72 per year vs. $1,128 per year)
    - For Permeator we calculated annual cost of $3,775.72, using same term and interest rate
- I was able to essentially duplicate your results for the case with MW = 114 & 285 ft3/lb-mol; $5,700 per ton when no credit is taken for saved product. With saved product credit, I calculate a cost per ton of about $4,320.
- For the larger tank case on the data I submitted previously, it is quite interesting to note a REVENUE per ton is earned when the value of saved product is accounted for. Depending on the MW and specific volumes assumed, along with hours per day of venting (I calculated 25% of the day from the data submitted, and I chose also a lesser value of 16% for comparison), the revenue figures range from

$6,700 to $25,000 per year, and the net revenue per ton figures range from + $609 to + $1,170. These types of fuel savings figures are commercially significant and of course so are the associated reductions in tons/year of emissions; 5 to 18 tons/year !)

- Our emissions and fuel savings figures do not include the fugitive emissions; these would be calculated for times at pressure greater than zero, but less than the cracking pressure of the P/V valve(s).
- This simple example shows the importance of measuring pressure vs. time on Non Stage II GDF in order to simply, quickly and accurately quantify the mass of emissions which can be avoided as well as the fuel savings which can be earned by the GDF owner/operator.
- There seemed to be strong sentiment from Public Hearing Stakeholders opposed to pressure monitoring & pressure management that their storage tanks remain in negative pressure 100% of the time; reducing the practical value of pressure monitoring and/or management. However, in practice, it is likely not the case and a quantification of pressure vs time profiles on Delaware GDF, with data including seasonal variation will go a long way to clarifying this situation.

Please advise if you would like any additional information on our calculations.

Best Regards, Ted

Ted Tiberi
ARID Technologies, Inc.
323 S. Hale Street
Wheaton, IL 60187 USA
office: 630.681.8500
mobile: 708.557.0297
ttiberi@ARIDtech.com

Example data by DNREC

ullage, gal	pressure, iwc	p atm, iwc	volume in ullage vol, ft3		delta, ft3	delta t, min	ft3/min	ft3/hr	ft3/hr-tank	Capital Amortization carbon ($1,132.72)	permeator ($3,775.72)	$/yr
15,000	1	406.7	15036.88222	2010.27837								
15,000	2	406.7	15073.76445	2015.20915	4.93077845	60	0.08217964	4.93077845	1.64359282			
15,000	3	406.7	15110.64667	2020.13993	4.93077845	60	0.08217964	4.93077845	1.64359282			
15,000	4	406.7	15147.52889	2025.07071	4.93077845	60	0.08217964	4.93077845	1.64359282			
15,000	5	406.7	15184.41111	2030.00149	4.93077845	60	0.08217964	4.93077845	1.64359282			

Data submitted to DNREC by ARID

ullage, gal	pressure, iwc	p atm, iwc	volume in ullage vol, ft3		delta, ft3	delta t, min	ft3/min					
45,000	1	406.7	45110.64667	6030.83512								
45,000	2	406.7	45221.29334	6045.62745	14.7923353	10	1.47923353	88.754012	29.5846707			
45,000	3	406.7	45331.94	6060.41979	14.7923353	10	1.47923353	88.754012	29.5846707			
45,000	4	406.7	45442.58667	6075.21212	14.7923353	10	1.47923353	88.754012	29.5846707			
45,000	5	406.7	45553.23334	6090.00446	14.7923353	10	1.47923353	88.754012	29.5846707			

MW of Gasoline Vapors = 66 & 386 ft3/lb-mol

% time venting	hrs/day	MW	HC Conc		ft3/min	mass HC lb/min	mass HC lb/day	gasoline vol gal/day	gasoline vol gal/month	mass HC tons/year	no recovery Cost/ton $/ton	$/month Fuel Value $3.50/gal	$/year Fuel Value	with recovery cost/ton	
16%	3.84	66	46%		1.47923353	0.11634593	26.8061029	5.36122059	160.836618	4.89211378	($771.80)	$ 562.93	$ 6,755.14	$ 609.03	revenue/ton
25%	6	66	46%		1.47923353	0.11634593	41.8845358	8.37690716	251.307215	7.64392779	($493.95)	$ 879.58	$ 10,554.90	$ 886.87	revenue/ton
DNREC	1.2	66	46%		0.08217964	0.00646366	0.46538373	0.09307675	2.79230239	0.08493253	($13,336.65)	$ 9.77	$ 117.28	($11,955.82)	cost/ton

MW of Gasoline Vapors = 114 & 386 ft3/lb-mol

% time venting	hrs/day	MW	HC Conc		ft3/min	mass HC lb/min	mass HC lb/day	gasoline vol gal/day	gasoline vol gal/month	mass HC tons/year	no recovery Cost/ton $/ton	$/month Fuel Value $3.50/gal	$/year Fuel Value	with recovery cost/ton	
16%	3.84	114	46%		1.47923353	0.20096116	46.3014505	9.2602901	277.808703	8.45001472	($446.83)	$ 972.33	$ 11,667.97	$ 933.99	revenue/ton
25%	6	114	46%		1.47923353	0.20096116	72.3460164	14.4692033	434.076099	13.203148	($285.97)	$ 1,519.27	$ 18,231.20	$ 1,094.85	revenue/ton
DNREC	1.2	114	46%		0.08217964	0.01116451	0.80384463	0.16076893	4.82306776	0.14670164	($7,721.22)	$ 16.88	$ 202.57	($6,340.39)	cost/ton

MW of Gasoline Vapors = 114 & 285 ft3/lb-mol

% time venting	hrs/day	MW	HC Conc		ft3/min	mass HC lb/min	mass HC lb/day	gasoline vol gal/day	gasoline vol gal/month	mass HC tons/year	no recovery Cost/ton $/ton	$/month Fuel Value $3.50/gal	$/year Fuel Value	with recovery cost/ton	
16%	3.84	114	46%		1.47923353	0.27217897	62.7100347	12.5420069	376.260208	11.4445813	($329.91)	$ 1,316.91	$ 15,802.93	$ 1,050.91	revenue/ton
25%	6	114	46%		1.47923353	0.27217897	97.9844293	19.5968859	587.906576	17.8821583	($211.14)	$ 2,057.67	$ 24,692.08	$ 1,169.68	revenue/ton
DNREC	1.2	114	46%		0.08217964	0.01512105	1.08871588	0.21774318	6.53229528	0.19869065	($5,700.90)	$ 22.86	$ 274.36	($4,320.08)	cost/ton

blank page

Gao, Frank F. (DNREC)

From: Gao, Frank F. (DNREC)
Sent: Tuesday, September 30, 2014 8:41 AM
To: Haynes, Robert P (DNREC)
Cc: Ted Tiberi (ttiberi@ARIDtech.com); Fees, David F. (DNREC)
Subject: Arid comment 2-FW: 1124 Control of Volatile Organic Compound Emissions; Generation of Delaware Test Data on Non Stage II GDF

Bob,
Here is ARID comment 2. Thanks,
Frank

From: Ted Tiberi [mailto:ttiberi@ARIDtech.com]
Sent: Monday, September 22, 2014 5:12 PM
To: Gao, Frank F. (DNREC)
Cc: Jacobs, Michelle V. (DNREC)
Subject: Fwd: 1124 Control of Volatile Organic Compound Emissions; Generation of Delaware Test Data on Non Stage II GDF

Dear Frank,

If we want to submit a Proposal for measuring pressure profile in Non Stage II Delware GDF; how do you recommend that we proceed ? In other words; we would ask DNREC to allow an existing GDF using Stage II vapor recovery and an ARID PERMEATOR to deactivate their Stage II system in order for us to gather data on pressure profile. This seems very straightforward as the Permeator data logger and pressure monitor are already installed at numerous Delaware GDF sites. We would only need to simply deactivate the "front-end" Stage II system to gather this important data. Can you provide your recommendation on how we may best submit a formal request / Proposal for this action ?

Thanks and Regards, Ted

Ted Tiberi
ARID Technologies, Inc.
323 S. Hale Street
Wheaton, IL 60187 USA
office: 630.681.8500
mobile: 708.557.0297
ttiberi@ARIDtech.com

Begin forwarded message:

From: Ted Tiberi <ttiberi@aridtech.com>

Subject: Re: 1124 Control of Volatile Organic Compound Emissions; Generation of Delaware Test Data on Non Stage II GDF
Date: August 29, 2014 10:11:31 AM CDT
To: "Fees, David F. (DNREC)" <David.Fees@state.de.us>
Cc: "Amirikian, Ronald A. (DNREC)" <Ronald.Amirikian@state.de.us>, "Gao, Frank F. (DNREC)" <Frank.Gao@state.de.us>, "Joshua M. Worth" <joshua.m.worth@wawa.com>, Michelle.Jacobs@state.de.us, luke howard <lhoward@aridtech.com>

Dear Ron,

Our Luke Howard attended the Public Hearing last nite in Delaware (We had "Curriculum nite" here for our 7th grader, so I was not able to attend your meeting). We will submit detailed formal comments as a follow-up before your stated deadline.

I understand GDF owners are eager to generate CPM data on Delaware GDF operating without Stage II. In fact, in a personal discussion with Josh Worth from Wawa, he indicated a strong desire to install ARID's CPM gear to generate such data.

I suggest the following;

- ARID has seven (7) Wawa sites in Delaware operating with the use of PERMEATOR. We ask DNREC to allow Wawa to temporarily deactivate the Stage II systems at one or two Wawa sites in order to simulate Non Stage II dynamics. This is easily accomplished by blanking off the vacuum pump inlet. Next, ARID to monitor the combined storage tank ullage pressure from such a Non Stage II 24/7 site in Delaware. From this data monitoring, the dynamics and associated vapor losses (if any) from a 24/7, Non Stage II site operating in Delaware can be quantified and provide the business case for CPM.

- Allow Wawa to forego installation of Stage II on one of their newly constructed sites in Delaware (they have two sites planned over the next 6 months) in conjunction with installation of the ARID CPM to monitor the combined storage tank ullage pressure.

We also have interest from other GDF owners for generating data at sites which are not 24/7. Installation of our CPM on this type of GDF can provide valuable, Delaware-specific data on pressure profiles at Non Stage II sites which close overnite.

Please advise on how we might proceed with timely installation of CPM gear to generate Delaware specific data on Non Stage II GDF. We are ready to begin next week.

Best Regards, Ted

Ted Tiberi
ARID Technologies, Inc.
323 S. Hale Street
Wheaton, IL 60187 USA
office: 630.681.8500
mobile: 708.557.0297

ttiberi@ARIDtech.com

On Aug 11, 2014, at 2:53 PM, Fees, David F. (DNREC) wrote:

Ted,

Delaware is relying on CARB EO's for certified CPM technology. Delaware would consider other CPM systems that are part of future CARB EOs.

If you have any other comments or concerns, we look forward to hearing them at the public hearing.

Dave

David F. Fees, P.E.
Managing Engineer
Emission Inventory Development Program
Division of Air Quality, DNREC
tel. (302) 739-9402, fax (302) 739-3106
e-mail: david.fees@state.de.us

Blue Skies Delaware; Clean Air for Life

From: Ted Tiberi [mailto:ttiberi@aridtech.com]
Sent: Monday, August 11, 2014 2:55 PM
To: Fees, David F. (DNREC)
Cc: Gao, Frank F. (DNREC); Amirikian, Ronald A. (DNREC)
Subject: Re: 1124 Control of Volatile Organic Compound Emissions

Hi Dave,

Thanks for your reply.

Please advise on your reply relative to our comment on TP-201.7. More specifically, has DNREC excluded ARID from supplying our CPM solution to GDF owners/operators in Delaware ?

Regards, Ted

Ted Tiberi
ARID Technologies, Inc.
323 S. Hale Street
Wheaton, IL 60187 USA
office: 630.681.8500
mobile: 708.557.0297
ttiberi@ARIDtech.com

On Aug 11, 2014, at 9:46 AM, Fees, David F. (DNREC) wrote:

Ted,

We took your comments as a submittal to the record and were prepared to answer them along with other comments received. I see that you have several questions that I will attempt to answer.

Q1 – What scenario or equation is relevant for non-Stage II case? Refer to Section 3.2 of CP-201 for Stage I systems. The equation is the same as for vacuum assist systems with 1-6 nozzles.

Q2 – What is the basis for the 0.5" below the P/V valve cracking pressure? The basis is the positive cracking pressure as determined by the TP201.1E CARB test.

Q3 – Negative pressures included? Average pressure tabulated? The requirement is based on elapsed time on a weekly basis. Negative pressures are below the cut-point, so would count in the elapsed time. Average pressure is not used for this requirement.

Q4 – What is scalable pressure range for the pressure sensor used in CPM? I'm not sure the meaning of your question.

Hope these answers help you as you prepare the comments you intend to submit at the public hearing. Anyone attending the public hearing may submit written comments, and read those written comments, or make oral comments. Not sure of the allowance for "presentations" as you noted in your e-mail to Frank Gao.

Regards,

Dave

David F. Fees, P.E.
Managing Engineer
Emission Inventory Development Program
Division of Air Quality, DNREC
tel. (302) 739-9402, fax (302) 739-3106
e-mail: david.fees@state.de.us

Blue Skies Delaware; Clean Air for Life

From: Ted Tiberi [mailto:ttiberi@aridtech.com]
Sent: Tuesday, August 05, 2014 2:07 PM
To: Gao, Frank F. (DNREC)
Cc: Fees, David F. (DNREC); Amirikian, Ronald A. (DNREC)
Subject: 1124 Control of Volatile Organic Compound Emissions

Dear Mr Gao,

Thank you for taking time to discuss elements of the recent DNREC proposal on "Vapor Emission Control at Gasoline Dispensing Facilities".

Per our discussion and your recommendation, I have attached my Comments & Questions.

ARID appreciates the opportunity to work with DNREC and Delaware GDF owners/operators for meeting CPM requirements. As I

mentioned, ARID has over 21 years of experience in this field, and we have technology and deep insights which are directly applicable in meeting the CPM requirement outlined in your recent proposal.

Please advise on how we can discuss your feedback to the attached.

Best Regards, Ted

Ted Tiberi
ARID Technologies, Inc.
323 S. Hale Street
Wheaton, IL 60187 USA
office: 630.681.8500
mobile: 708.557.0297
ttiberi@ARIDtech.com

Blank page

Gao, Frank F. (DNREC)

From: Gao, Frank F. (DNREC)
Sent: Tuesday, September 30, 2014 8:43 AM
To: Haynes, Robert P (DNREC)
Cc: Ted Tiberi (ttiberi@ARIDtech.com); Fees, David F. (DNREC)
Subject: Arid comment 3-FW: Follow up materials from DE Public Hearing
Attachments: BROstatement Expansion of Vapour Recovery at Petrol Service Stations.....FANTASTIC REVIEW.pdf; GasFindIR Gasoline Fumes.wmv; Customer Exposure to Gasoline Vapors.pdf

Bob,
Here is ARID comment 3. There are 3 attachments to this e-mail. Thanks,
Frank

From: Ted Tiberi [mailto:ttiberi@aridtech.com]
Sent: Tuesday, September 23, 2014 11:44 AM
To: kstewart@lunginfo.org
Cc: luke howard; Gao, Frank F. (DNREC)
Subject: Follow up materials from DE Public Hearing

Hi Kevin,

I read with interest the Transcript of your comments from the recent DNREC Public Hearing on vapor recovery. My colleague, Luke Howard exchanged business cards with you after the meeting.

We are active now in Australia; where Stage II (VR2) requirements are just coming into use.

I've attached a copy of the DECCW 2009 report from Australian Government which makes a strong case for VR2 implementation. Of particular note, their study has assessed real costs for health impacts and premature death due to toxics exposure. I have attached also a FLIR (Forward Looking Infrared) video showing qualitative impact of Non Stage II, Non ORVR refueling event on the motorist. I have also a attached an objective Finnish study which quantitatively shows the impact of Stage II vs Non Stage II refueling emissions on the motorist. (both cases are for Non ORVR scenario). Perhaps the Lung Association is interested in these adverse, negative impacts of removing Stage II and of neglecting Continuous Pressure Monitoring and/or Pressure Management technologies.

Please advise if I can provide any additional information on the topic of GDF (gasoline dispensing facility) vapor losses.

Best Regards, Ted

Ted Tiberi
ARID Technologies, Inc.
323 S. Hale Street
Wheaton, IL 60187 USA
office: 630.681.8500
mobile: 708.557.0297
ttiberi@ARIDtech.com

blank page

Better Regulation Statement

Expansion of Vapour Recovery at Petrol Service Stations in the NSW Greater Metropolitan Region

Department of
Environment, Climate Change and Water NSW

Disclaimer

Published by:

Department of Environment, Climate Change and Water
59–61 Goulburn Street, Sydney
PO Box A290
Sydney South 1232
Phone: 131 555 or (02) 9995 5000 (switchboard)
Fax: (02) 9995 5999
TTY: (02) 9211 4723
Email: info@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

ISBN 978 1 74232 502 6
DECC 2009/800
November 2009

1. Executive Summary

In August 2007 Cabinet approved the release of a Discussion Paper proposing the phased expansion of vapour recovery requirements at petrol service stations in the NSW Greater Metropolitan Region (GMR). After further Cabinet consideration (Cabinet Minute 218-07), in November 2007 the Deputy Premier announced the Government's intention to phase-in the introduction of Stage 2 Vapour Recovery, commencing with new, refurbished and large petrol service stations and then several years later for the medium-sized petrol service stations. The Government agreed to exempt the smallest petrol service stations unless they are rebuilt or substantially modified.

Proposed approach is proportionate to the policy problem

Petrol vapour emissions at petrol service stations are a significant and growing source of air pollution in the NSW GMR. Petrol vapour contains toxic volatile organic compounds (VOCs) which contribute to localised and regional-wide (ground-level ozone) air pollution. Vapour recovery at petrol service stations provides immediate health protection benefits by reducing personal exposure to toxic substances in petrol vapours like benzene.

The installation of technology known as Stage 1 Vapour Recovery (VR1) captures the vapour displaced from underground storage tanks as the tanks are filled by road tankers. The installation of Stage 2 Vapour Recovery (VR2) controls the emissions from filling vehicle tanks.

A market intervention is justified to reduce the unintended effects of air pollution. The external cost of air pollution from petrol vapour emissions is not included in the price of petrol and there is no incentive to reduce the impact of fuel on pollution.

In line with NSW State Plan targets, new strategies are required to address the long-term challenge of reducing ground-level ozone pollution in the NSW GMR. The NSW GMR currently is not projected to meet the national health based air quality standards which are key targets in the State Plan air target.

The implementation of refuelling vapour recovery at petrol service stations in the NSW GMR is estimated to provide about 15% of the VOC reduction required to meet the State Plan target.

Outline consultation approach and summary of stakeholder views of the proposals

Consultation has included:

- convening an Expert Reference Group (including oil company representatives) to consult on the conduct of the equipment trial and subsequent economic analysis
- discussions with local suppliers of service station equipment
- an extensive series of one-on-one meetings with key stakeholders
- a Discussion Paper proposing phased expansion of vapour recovery at petrol service stations for public comment
- several broader industry meetings and speaking engagements at industry association seminars and national conferences
- draft Regulation and 'Standards and Best Practice Guidelines' for public comment
- presentations, open to all stakeholders, provided in Sydney and Melbourne
- summary document providing clarifications and proposing minor changes to resolve technical details forwarded to submitters for information and any further comment
- additional stakeholder meetings offered to any interested stakeholder if requested.

Themes that emerged from the public consultation included:

- a broad 'in-principle' support for expanding vapour recovery by regulation, provided industry has sufficient time to cost effectively phase-in the technology
- all petrol service stations be required to install VR2 along with robust monitoring and reporting to ensure consistent compliance and verifiable environmental benefits
- smaller petrol service stations and other groups advocated the exemption threshold for petrol service stations be increased to 3.5 million litres per year, which is the threshold in the UK
- local Government and community groups argued that residents outside of the Sydney region should also be afforded the benefits of expanded vapour recovery
- resolution of minor technical matters sought through incorporation of additional flexibility mechanisms without impacting on emission reductions achieved.

Show preferred option provides greatest net benefit or least cost to community

The preferred option is the proposed amendment of the Regulation. It would phase in VR2 from mid 2010 to 2017 for all Sydney petrol service stations with a petrol throughput greater than 3.5 million litres per year and Newcastle, Wollongong and Central Coast petrol service stations with a petrol throughput greater than 12 million litres per year. This option also requires VR1 compliance by 2014.

The phase-in enables many petrol service stations to install VR2 as part of their scheduled refurbishment program, and allows sufficient lead-time for a planned and orderly introduction of the new technology.

Existing petrol service stations in Sydney below the threshold limit of 3.5 million litres per year, and those in other metropolitan regions of the GMR below the threshold limit of 12 million litres per year, would only be required to install VR2 during construction or major refurbishment.

This enables these smaller or more remote petrol service stations to install VR2 with minimal disruption and at least cost to the service station operator. As these petrol service stations account for only a small proportion of regional petrol throughput, the slower adoption of VR2 by them does not significantly delay the VOC emission reduction benefits from VR2.

The net benefit of this option is estimated to be $125 million in health and other costs avoided, expressed in present values terms over the period till 2040. This option also recovers nearly 8 million litres of petrol annually by 2015 and 10 million litres of petrol annually by 2030.

The alternative option, to not specify a compliance date but to require installation of VR2 when petrol service stations are modified, provides a net benefit of only $54 million, due to the slower rate of upgrade and thus benefit delivered to the community.

2. Need for Government Action

2.1 Context

Petrol vapour emissions at petrol service stations are a significant and growing source of air pollution in the NSW GMR. Petrol vapour contains toxic volatile organic compounds (VOCs) which contribute to localised and regional-wide ground-level ozone air pollution.

In line with NSW State Plan targets, new strategies are required to address the long-term challenges to reduce ground-level ozone pollution in the NSW GMR. The NSW GMR currently is not projected to meet the national health based air quality standards which are key targets in the State Plan air target.

There is a market failure to allocate the resource of clean air efficiently. Clean air is a public good and price signals fail to reflect true social benefits of clean air. A market intervention is justified to reduce the unintended effects of air pollution. The external cost of air pollution from petrol vapour emissions is not included in the price of petrol and there is no incentive to reduce the impact of fuel on pollution.

A range of market intervention mechanisms are utilised internationally to reduce ozone to safe levels. Vapour recovery at petrol service stations is a very cost effective mechanism able to achieve large VOC emission reductions. Cleaner production equipment at petrol service stations that reduces petrol vapour emissions when vehicles refuel has been required in the United States (US) and many European countries since the mid 1990s, and more recently in parts of Asia.

The need for NSW Government action on this issue was recognised by the Premier in March 2007 when announcing a government initiative to expand vapour recovery at petrol service stations to reduce petrol vapour emissions by over 5,000 tonnes per year and deliver improvements in regional and local air quality.

The implementation of refuelling vapour recovery at petrol service stations in the NSW GMR is estimated to provide about 15% of the VOC reduction required to meet the State Plan target.

2.2 VOC emissions from petrol service stations

Liquid petrol evaporates inside a car fuel tank to fill the empty space in the tank. As a car is refuelled, these petrol vapours are pushed out of the tank by the incoming fuel and, unless controlled, escape into the atmosphere. This is the source of the visible haze and strong odour evident at petrol dispensers when vehicles refuel.

In 2007, petrol service stations in the Sydney region emitted over 7,500 tonnes of VOCs, or about 4-5% of the region's total human related VOC emissions. VOC emissions from petrol service stations are increasing with fuel usage at a rate of about 1.5% per year.

While national vehicle emission standards have tightened over time, refuelling emissions have increased relative to other vehicle related emissions commensurate with growth in fuel use. Motor vehicle refuelling emissions remain the most significant uncontrolled vehicle related emission source.

2.3 Ozone levels in Sydney

In sunny, still conditions and in the presence of nitrogen oxides, VOCs react to form ground-level ozone. This is one of the components of summertime smog, which harms human

health, vegetation and building materials. Each summer the Sydney region exceeds national health-based ozone standards.

Ozone is a highly irritating air pollutant. Exposure to concentrations found in Sydney can be harmful to people's health. Increases in levels of ozone are associated with increased hospitalisations for respiratory diseases and mortality. Repeated exposure to ozone can make people more susceptible to respiratory infection and aggravate pre-existing respiratory diseases such as asthma. Children who are active outdoors during the summer when ozone levels are at their highest are particularly at risk of experiencing such effects. Other at-risk groups include outdoor workers, the elderly and individuals with pre-existing respiratory diseases such as asthma.

The population of the NSW GMR is forecast to grow to 5.91 million by 2022. This growth will increase industrial and residential development, and see continued growth in the ownership and use of motor vehicles and fuels. Global warming is also expected to exacerbate ozone formation, making national standards even more difficult to achieve.

If the Sydney region is to meet national ozone standards the Department of Environment, Climate Change and Water (DECCW) estimates that VOC emissions need to be reduced by at least 34,000 tonnes per year (or 25%) from present levels.

Ground level ozone is also a potent global warming gas and is the third most important greenhouse forcing agent after carbon dioxide and methane. Notwithstanding, ozone receives less attention for its contribution to global warming than for its direct impacts on human health. Ozone precursor emissions are not directly controlled under the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, however, in recognition of the role these pollutants have as greenhouse gases, Parties must report on their emissions of VOCs, oxides of nitrogen and carbon monoxide.

2.4 VOC emissions and air toxics

As well as contributing to ozone formation, VOCs in petrol vapour can have direct health and odour amenity impacts on service station employees, and people living and working in the vicinity of a service station.

Petrol contains 1% benzene. Benzene is a human carcinogen and there is no safe level of human exposure to benzene. Long-term exposure to benzene has been linked with increased incidence of leukaemia.

Recent Australian research (Horton *et al.* 2006) has found that vehicle refuelling is associated with exposure to benzene concentrations up to 3 orders of magnitude (1,000 times) higher than typical ambient concentrations. The research also found that vehicle refuelling makes the most significant contribution to the population's non-occupational exposure to benzene, accounting for 85% of the population's summertime exposure to benzene.

3. Objective of Government Action

The objective of the proposed action is to reduce risks to human health and prevent the degradation of the environment by reducing VOC emissions from motor vehicles and petrol service stations. The reduction of VOC emissions in the NSW GMR will help NSW meet national air quality goals as required by the State Plan air target.

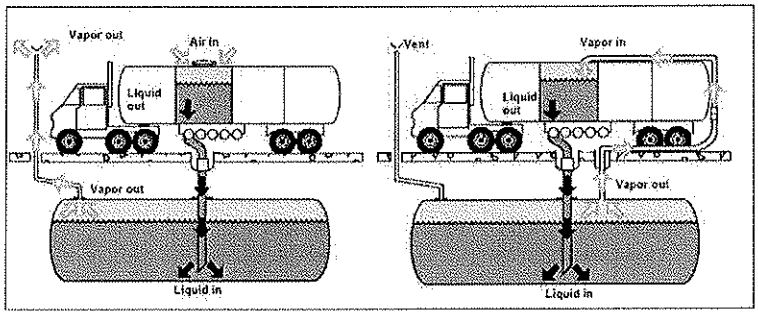
3.1 The reduction of petrol vapour emissions at petrol service stations

VOC emissions arise from a number of sources at petrol stations, including the vapour expelled from a vehicle's petrol tank as the tank is filled; drips from the filling nozzle; leaks from hoses and gaskets; and vapour expelled from underground storage tanks as they are refilled by road tankers.

VR1 technology captures the emissions from underground storage tanks as the tanks are filled by road tankers. The installation of Stage 2 Vapour Recovery (VR2) controls the emissions from filling vehicle tanks at the petrol pump.

Stage 1 Vapour Recovery

VR1 involves the collection of the vapour occupying the empty space in the underground petrol storage tank while the tank is being filled by the road tanker. The vapour displaced by the rising liquid level is fed into the vapour space of the tanker as the liquid level in the tanker falls. This provides a closed loop of liquid and vapour transfer between the tank and tanker. See diagram below.



Source: Wolf H Koch, Petroleum Equipment & Technology, July 1998

When the tanker returns to the terminal for refilling, the vapour displaced from the tanker is collected through the gantry and returned to the terminal tank storage via a vapour recovery unit that condenses the vapour into a liquid. Condensers and/or activated carbon beds commonly control vapour release from the storage tanks at the refinery or terminal.

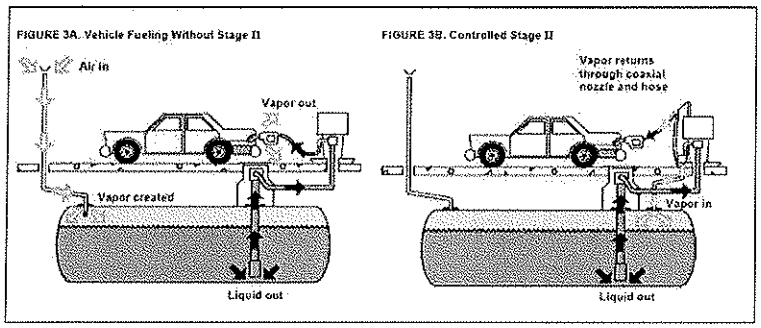
The equipment modifications required consist of additional piping for the vapour transfer. For VR1, this involves underground excavation to install pipe-work to the storage tank, and additional pipe-work and connections on the road tanker.

VR1 at petrol service stations has been required by regulation in the majority of the Sydney metropolitan area since 1986. A number of new and newly refurbished petrol service stations in the Newcastle, Central Coast and Wollongong regions have installed VR1, even though this has not been required by regulation. They have done this for occupational health and safety reasons, and because it is cost effective to do so especially when fuel is delivered by road tanker from a terminal in the Sydney region.

Since the introduction of VR1 in Sydney in 1986, the population and urban areas of Sydney have grown rapidly. International best practice for emission controls at petrol service stations has also developed substantially in this time.

Stage 2 Vapour Recovery

VR2 captures petrol vapours at the petrol pump when motor vehicles refuel. It involves the capture of the vapour in the vehicle's fuel tank and the transfer of these vapours to the underground storage tank, preventing their release into the atmosphere. See diagram below.



Source: Wolf H Koch, Petroleum Equipment & Technology, July 1998

When installing VR2, in addition to the vapour piping system, a vacuum pump is required to create suction to return the vapour from the vehicle's petrol tank to the underground tank, ensuring that no vapour escapes from the space around the nozzle. This vacuum is controlled to capture at least 95 per cent of petrol vapours.

VR2 technology was introduced in Europe and the United States in the early 1990s and is required in numerous countries where petrol vapour emissions are also the cause of local and regional air pollution. The use of VR1 and VR2 technology is considered best practice for management of petrol vapour at petrol stations. A summary of international schemes to implement VR2 is shown in the table below.

International schemes to implement VR2 at petrol service stations

State	First Year in Force	Implementation Timescale	% of petrol service stations with VR2 (2004)
Austria	1993	5 years	99%
Czech Rep	Details unavailable		52%
Denmark	1995	5 years	>90%
France	2001	18 months	45%
Germany	1993	5 years	100%
Hungary	Details unavailable		71%
Italy	1996	4 years	100%
Luxembourg	1992	4 years	98%
Netherlands	1996	3 years	100%
Sweden	1992	3 years	90%
Switzerland	Details unavailable		100%
US (Clean Air Act) ~ 27 States	1993	Varies across states	
Mexico	Details unavailable		>90%
Taiwan	1997 & 2005	2 years	>88%
China (Hong Kong)	2005	3 years	
China (Beijing)	2004	Details unavailable	
UK	2006	5 years	3%

4. Consideration of Options

4.1 Evaluation of vapour recovery commenced in 2002

In 2002 the then Environment Protection Authority commenced an evaluation of refuelling vapour recovery at petrol service stations to inform future decision-making on ozone management strategies. This evaluation included:

- undertaking an equipment trial of VR2 systems, including management and user surveys, in partnership with Gosford and Blacktown City Councils;
- convening an Expert Reference Group (including oil company representatives) to consult on the conduct of the equipment trial and subsequent economic analysis;
- commissioning independent economic analysis on the cost effectiveness and retail market impacts of VR2;
- undertaking a survey of all retail petrol service stations identified in the NSW GMR;
- consulting with local suppliers of service station equipment; and
- reviewing the costs and policy and regulatory frameworks of international schemes to implement VR2.

On the basis of the comprehensive work undertaken by DECCW, in March 2007 the Premier announced the Government's intention to reduce "harmful petrol vapours by capturing smog-forming emissions through equipment installed at petrol station pumps".

4.2 Release of Public Discussion Paper in August 2007 and consideration of public submissions

Following Cabinet approval, the NSW Government released a Public Discussion Paper in August 2007 outlining a rationale for emission controls at petrol service stations and proposing the phased expansion of refuelling vapour recovery at petrol service stations in the NSW GMR. At the time of the Discussion Paper's release, DECCW undertook an extensive series of meetings with all key stakeholders to inform them about the proposal and seek their formal comment.

Key themes to emerge from the public consultation guided significant changes in the policy proposal, and included the following:

- There was broad 'in-principle' support for expanding vapour recovery by regulation, provided industry has sufficient time to cost effectively phase-in the technology and that new cost data is considered.
- All petrol service stations be required to install VR2 along with robust monitoring reporting to ensure consistent compliance and verifiable environmental benefits.
- Smaller petrol service stations and other groups advocated the exemption threshold for petrol service stations be increased to 3.5 million litres per year, which is the threshold in the UK.
- Equipment manufacturers, suppliers and certifying bodies advised that sufficient lead-in time would be required to bring suitably certified VR2 technology to the Australian market that is compliant with Australian Standards.
- Local Government and community groups argued that residents outside of the Sydney region should also be afforded the benefits of expanded vapour recovery.
- Contractors advised of the industry's current skills shortage, the backlog of the service station construction work and technical constraints on industry to immediately roll-out VR2, should this be required.

- The Australian motor vehicle industry strongly opposed the consideration of Onboard refuelling vapour recovery (ORVR) as an alternate option to refuelling vapour recovery.

In response to issues raised, the original proposal outlined in the Discussion Paper was revised to incorporate the following key changes:

- increasing the exemption threshold for the retrofitting of VR2 to 3.5 million litres per annum, and requiring all new petrol service stations and those undergoing major modification to install VR2, regardless of their size
- expanding the geographic area where VR1 and VR2 technology is prescribed
- providing a two-year lead-in period to allow equipment suppliers to bring certified equipment to the market, for the up-skilling of industry and the development of industry guidance.

4.3 Revised economic analysis of costs of proposed approach and retail market impacts

In September 2007, the Department of Environment, Climate Change and Water (DECCW) contracted an independent economic consultant McLennan Magasanik Associates (MMA) to update its earlier (2005) analysis of the cost effectiveness and retail market impacts of expanding vapour recovery in the NSW GMR. The study, which also estimated impacts on petrol prices, was re-run to include updated cost and fuel throughput data received during public consultation.

The cost of implementing VR1 is estimated to be between $2,000 and $6,000 per underground storage tank depending on whether installation occurs at the time of a scheduled refurbishment.

The cost of implementing VR2 is estimated to be between $20,000 and $450,000 per service station, depending on its size (the number of dispensers) and the timing of refurbishment i.e. whether the installation coincides with a refurbishment. It is estimated that the extended compliance time-frame will allow the implementation of VR2 at nearly all petrol service stations to coincide with a scheduled major refurbishment.

The capital equipment and installation costs depend on whether the service station already has VR1 installed, the timing of the installation, and whether it is carried out at the same time as a major station refurbishment.

Operating costs of VR1 and VR2 include the additional maintenance and repair costs and the additional electricity consumption associated with vacuum pumps and controls.

Compliance costs include type certification of the equipment, compliance monitoring at installation, periodical compliance monitoring and in station diagnostics (equipment monitoring by service station workers).

Loss of trade may occur due to the disruption of installing the equipment. Depending on the number of bowsers the site may be partially closed or out of operation.

By proposing a compliance time-frame from 2010 to 2017 and excluding petrol service stations with throughputs of less than 3.5 million litres per year, the cost to the community per litre of fuel, ranges from 0.02 to 0.19 cents per litre, depending on the size and fuel throughput levels of the service station. Given that the price of petrol regularly fluctuates daily by many cents per litre, the impact of implementing VR2 will be negligible.

With an average weekly petrol consumption of around 35 litres per household, a price increase of between 0.02 cents and 0.19 cents per litre, would add between 0.7 cents and 7 cents to weekly household expenditure.

4.4 Reducing the potential impacts on smaller petrol service stations

The proposed threshold to exempt petrol service stations with fuel throughput of less than 3.5 million litres per year will protect smaller sites from the potential disproportional impacts of the cost of installing VR2, especially in circumstances where small petrol stations provide local services in addition to fuel sales such as groceries and vehicle repairs, and where there may be fewer options available for local residents.

Submissions received during public consultation and information published in relation to Australian Competition and Consumer Commission inquiries highlight that small petrol service stations are often placed under considerable pressure from lower priced fuel offered by supermarkets and oil majors. This pressure will continue to have the greatest bearing on the profitability of smaller sites and continue to drive their further rationalisation.

Smaller petrol stations emit proportionately fewer emissions than other categories of petrol service stations as they comprise only a small proportion (approximately 13%) of total fuel sold. Economic analysis shows that the introduction of VR2 is considerably less cost effective for small petrol service stations and results in only a relatively small additional decrease in emissions.

The proposed threshold excluding small petrol service stations from VR2 requirements is based on equity considerations and aims to maximise emission reductions whilst minimising the economic and community impacts.

4.5 November 2007 announcement on vapour recovery

After Cabinet consideration (Cabinet Minute 218-07) the Government announced in November 2007 its intention to expand vapour recovery at petrol service stations in the NSW GMR. Key elements of the proposal take into account a range of issues raised in the public consultation phase which included:

- Broadening the geographic area of VR1 to include all of the Sydney metropolitan area and the Lower Hunter, Illawarra, and Central Coast.
- Requiring VR2 be installed at new sites and when major modifications take place in Sydney, Newcastle, Central Coast and Wollongong regions.
- Requiring VR2 be fitted to existing sites in Sydney and also at the very largest petrol service stations in Newcastle, Central Coast and Wollongong.
- Exempting small petrol service stations from any requirement to install VR2, unless they are rebuilt or undergo major modification.
- Providing a lead-in from 2008 to 2010 to undertake a range of issues includes equipment certification, industry up-skilling, resolution of technical issues and development of industry code of practice and guidelines.

A phased approach to implementation of VR1 and VR2 was proposed based on the size of the service station and whether they are new versus existing petrol service stations. This is to achieve the greatest pollution reductions while at the same time managing the practical

issues around the roll-out and certification of equipment and the cost implications for different sized petrol service stations.

The 2010 to 2017 staging of VR1 and VR2 compliance provides the opportunity for nearly all petrol service stations to install equipment as part of a scheduled refurbishment and gives sufficient lead-time for a planned and orderly introduction of new technology.

4.6 December 2008 release of draft Regulation for public comment

Public consultation on the draft Regulation and Guidelines was undertaken between mid December 2008 and late February 2009.

Stakeholder submissions received were largely of a technical nature. Due to the detailed nature of these technical comments a summary document providing clarifications and proposed minor changes was forwarded to submitters for information and any further comment. Additional stakeholder meetings were also offered to any interested stakeholder. This additional consultation step has assisted development of the regulation and guidelines and promotion of a flexible approach which also ensures industry best practice.

A Code of Practice providing technical guidance in relation to the design, installation, commissioning, operation and maintenance of stage 2 vapour recovery equipment at petrol service stations is planned to be finalised by September 2009.

4.7 Identified Options

Option 1: No VR2 required - 'business as usual' or maintaining the status quo

The status quo or 'do-nothing approach' would not result in any reduction of VOC emissions. It would maintain the current situation whereby the petrol vapour expelled from motor vehicle fuel tanks during refuelling would continue to be emitted to the atmosphere and result in local exposure to VOC emissions and ground-level ozone. Petrol vapour emissions would continue to grow at a rate of between 1 to 2% per annum, commensurate with growth in fuel use.

Option 2: VR2 with phased-in compliance

This option is the proposed amendment of the Regulation. It would phase in VR2 from mid 2010 to 2017 for all Sydney petrol service stations with a petrol throughput greater than 3.5 million litres per year and Newcastle, Wollongong and Central Coast petrol service stations with a petrol throughput greater than 12 million litres per year. This option also requires VR1 compliance by 2014.

The phase-in enables many petrol service stations to install VR2 as part of their scheduled refurbishment program, and allows sufficient lead-time for a planned and orderly introduction of the new technology.

Existing petrol service stations in Sydney below the threshold limit of 3.5 million litres per year, and those in other metropolitan regions of the GMR below the threshold limit of 12 million litres per year, would only be required to install VR2 during construction or major refurbishment. This enables these smaller or more remote petrol service stations to install VR2 with minimal disruption and at least cost to the service station operator. As these petrol service stations account for only a small proportion of regional petrol throughput, the slower adoption of VR2 by them does not significantly delay the VOC emission reduction benefits from VR2.

Option 3: VR2 with no compliance date

This option requires VR2 installation with no compliance date deadline for existing petrol service stations. It would allow all petrol service stations to install VR2 during either construction or major refurbishment. Installing VR2 at these times minimises the installation and disruption costs incurred by the service station operator. However, as VR2 is installed more gradually, reductions in emissions would also occur at a slower rate.

Option 4: Voluntary agreement with fuel retail industry to employ VR2

DECCW has considered the introduction of VR2 via a negotiated agreement with industry, an approach that was tried in the UK.

The negotiated agreement would be based on industry achieving an 85 to 90% reduction in refuelling emissions in the GMR region within a specified timeframe. Such an approach would enable industry to install VR2 at locations of its choosing where it would be most cost effective, and offer flexibility in meeting required VOC reductions. Such an agreement potentially offers scope for reducing the cost of the measures.

However, given market competition, fragmentation and a multitude of business ownership structures it is difficult to envisage how a consistent industry-wide agreement could be executed. The UK experience was not successful, and does not lend support to a negotiated approach to the implementation of VR2 in NSW.

DECCW has also had poor experience with the oil industry in executing and honouring voluntary agreements in relation to meeting fuel quality specifications.

Stakeholders argued that if vapour recovery was to be expanded it required an efficient regulatory approach that could provide for consistency of application and certainty of environmental outcome.

A voluntary industry agreement was not deemed a robust or credible mechanism to implement VR2 that could offer consistency of application and certainty of environmental outcome, within a very competitive business environment.

Option 5: National regulation requiring on-board refuelling vapour recovery

Onboard refuelling vapour recovery (ORVR) is an in-vehicle emission-control system that utilises a large canister to capture fuel vapours from the vehicle's petrol tank during refuelling. ORVR is an alternative approach to VR2 for capturing fuel vapours. ORVR is used across North America (in addition to VR2 which is required in many US States).

The use of ORVR in Australian vehicles would require new Commonwealth regulation (to change Australian Design Rules (ADR) for motor vehicles) and the reengineering of new vehicles sold in Australia. ORVR cannot be retrofitted to the existing vehicle fleet, therefore refuelling emission reductions will only be commensurate with the retirement of old vehicles and the uptake of new vehicles. Significant emission reductions could not be realised until the new national vehicle standards have been developed (~5 years); sufficient lead-time is given to vehicle manufacturers (~5 years); and sufficient fleet turnover has taken place (10 to 15 years).

The Australian motor vehicle industry strongly opposes the consideration of ORVR as a viable alternative to refuelling vapour recovery, noting that requirements for ORVR are inconsistent with the Australian Government's policy to harmonise with international vehicle regulations and inconsistent with international agreements affecting vehicle regulations,

including United Nations Economic Commission for Europe, World Trade Organisation (WTO) and Asia- Pacific Economic Cooperation (APEC) commitments.

Notwithstanding, given that ORVR is not prescribed under international vehicle regulations, there would be a lengthy and resource-intensive process to adopt a new rule incorporating ORVR into Australian Design Rules (ADRs). There are also uncertainties relating to the legality of such a move under WTO regulation.

The adoption of ORVR for the Sydney region is not considered a feasible alternative approach. It would require new ADRs for light passenger vehicles and would take at least 20 years to become sufficiently widespread across the vehicle fleet to make a significant impact on VOC emissions. Accordingly, ORVR as an option to reduce refuelling emissions in the NSW GMR is not considered a viable option, and further analysis is not warranted.

5. Cost and Benefits of Options

5.1 Costs

The costs and benefits of the phased-in compliance option and no compliance date option, relative to the base case of business as usual, are outlined below.

Option 1: Business as usual

This 'do nothing' option would maintain the current situation whereby the petrol vapour expelled from motor vehicle fuel tanks during refuelling would continue to be emitted to the atmosphere and result in VOC emissions and ground-level ozone.

Petrol service stations will continue to incur costs of inventory losses estimated to be 0.15% of service station fuel throughput at a total retail value of $45 million per year, with an average annual throughput of 20,000ML.

Option 2: Phased-in compliance

The total cost of this option is estimated to be $106 million expressed in present value terms over the period till 2040.

This cost includes the cost of capital equipment and installation, ongoing operating costs, disruption costs (foregone revenue while the service station is closed for installation), and compliance costs of ongoing inspection and certification. These costs are offset by the benefit of recovering petrol from the petrol vapour.

This option would result in an estimated additional cost to service station operators of less than 0.2 cents per litre of petrol sold. Although service station operators incur these costs, it is expected that some of this cost would be passed on to customers through higher petrol prices than would otherwise be the case.

The cost of installing VR2 at a service station varies depending upon the size of the service station and the number of bowsers, whether the installation occurs during construction or a scheduled refurbishment, and the location of the service station. Depending upon these factors, the total cost of implementing VR2 is estimated at between $20,000 and $450,000 per service station. It is cheaper to install VR2 during construction or major refurbishment as the bowsers would already be out of operation and the underground pipes exposed.

Option 3: No compliance date

The total cost of this option is estimated to be $43 million expressed in present values terms over the period till 2040. This option would result in an estimated additional cost to service station operators of less than 0.05 cents per litre of petrol sold.

The total cost would be lower with this option because it costs less for petrol service stations to install VR2 during construction or major refurbishment. The costs also occur more evenly over the period as there is no compliance date. However, the costs are less evenly distributed across the industry with the potential for some petrol service stations to benefit from installing VR2 later than their competitors.

5.2 Benefits

The principal environmental and health benefit of implementation will be the decrease in air pollution due to the reduction in VOC emissions released during petrol refuelling processes. VOCs are a precursor to ground level ozone, which is harmful to human health, vegetation and building materials. Petrol vapours also contain benzene, which is a human carcinogen.

The benefit of VR2 is the capture of petrol vapour that would otherwise be released into the air at petrol service stations as VOC emissions from the refuelling of motor vehicles.

Reducing petrol vapour at petrol service stations reduces people's exposure to benzene. Vehicle refuelling currently accounts for most of the Australian population's summertime exposure to benzene (Horton *et al.* 2006), which is a human carcinogen with no safe level of exposure (NICNAS 2001).

VOC emissions contribute to the formation of ground-level ozone, which increases mortality rates and respiratory related hospitalisations. Ozone also damages materials, crops and ecosystems. Estimates of the damage cost of VOC emissions and ground-level ozone are discussed below.

McLennan Magasanik Associates Pty Ltd recently investigated damage cost estimates and recommended the estimate for damage cost of VOC emissions in Sydney of $4,200 per tonne of VOC (MMA 2008). This estimate is derived from the €2,100 per tonne of VOCs estimate by the European Commission (Holland and Watkiss, 2002).

The European Commission estimate is based on a meta-analysis of damage cost estimates for major cities in Europe. It includes the cost of VOC emissions and ground-level ozone on human health, materials, crops and ecosystems. Mortality is valued using the value of life years lost, as opposed to the higher value of statistical life. This estimate also assumes that there is no concentration level threshold for damage.

Factors that may affect the transferability of this estimate to the GMR include:

- Population density is similar for the two relevant areas.
- Health systems are similar.
- Preferences upon which values are based. Australia ranks 15th in the GDP per capita list, while the European Union is 27th. Using average income as an indicator, the preferences upon which the European Commission estimates are based are comparable with preferences in the GMR.

The recommended damage cost estimate of $4,200 per tonne of VOC has therefore been used to value benefits within this assessment.

An alternative estimate is a damage cost of $19,300 per tonne of hydrocarbons by CSIRO (Beer 2002). Although this is an Australian estimate, it represents an upper-bound as it uses the value of statistical life method for mortality with a cost of $7.2 million per death, instead of the value of life years lost.

Less VOC emission and ground-level ozone may reduce deaths from VOCs or ozone related diseases. As these deaths would have occurred later in a person's life, the statistical average of the value of life may over-value the cost of that death. The value of life years lost method is more appropriate where the death occurs late in life and is brought forward as a result of VOC or ozone related diseases.

Option 1: Business as usual

This 'do nothing' option would maintain the current situation whereby the petrol vapour expelled from motor vehicle fuel tanks during refuelling would continue to be emitted to the atmosphere and result in VOC emissions and ground-level ozone.

No benefits result from this option.

Option 2: Phased-in compliance of VR2

The health benefit of this option is estimated to be $231 million expressed in present values terms over the period till 2040. This option also recovers nearly 8 million litres of petrol annually by 2015 and 10 million litres of petrol annually by 2030.

Option 3: No compliance date

The health benefit of this option is estimated to be $97 million expressed in present values terms over the period till 2040. This option recovers over 1 million litres of petrol annually by 2015 and about 6 million litres of petrol annually by 2030.

6. Consultation

Consultation has been collaborative over six years, including the forming of a Reference Group for the trial of VR2 equipment, consultation on the release of the discussion paper and regular consultation throughout the drafting of the Regulation and Guidelines.

A project Reference Group comprising the Australian hstitute of Petroleum, Caltex, Shell, Service Stations Association of NSW, Blacktown City Council, Gosford City Council, an independent expert from the University of Technology Sydney, and DECCW was established in November 2003 for the duration of the trial. The Reference Group's role was to keep stakeholders abreast of the work of the trial and receive their views and input on the trial; to consider reports on the trial's operation; and to consider general issues related to any wider application of VR2 in the Sydney region.

Formal consultation was held during August 2007 on the release of the discussion paper. DECCW undertook an extensive series of meetings with all key stakeholders to inform them about the proposal and seek their formal comment.

In response to issues raised the original proposal outlined in the Discussion Paper was revised to incorporate the following key changes:

- increasing the exemption threshold for the retrofitting of VR2 to 3.5 million litres per annum, and requiring all new petrol service stations and those undergoing major modification to install VR2, regardless of their size.
- expanding the geographic area where VR1 and VR2 technology is prescribed.
- providing a two-year lead-in period to allow equipment suppliers to bring certified equipment to the market and for the up-skilling of industry and the development of industry guidance.

DECCW has continued to consult widely with all stakeholders throughout the drafting of the Regulation and the 'Standards and Best Practice Guidelines'. Key stakeholders include the oil majors (Caltex, Shell, BP, Mobil), Woolworths, Service Station Association, health and environmental community groups, local government, equipment suppliers and industry contractors and national approval agencies for the certification of equipment.

Consultation has comprised a series of one-on-one meetings with key stakeholders, several broader industry meetings and speaking engagements at industry association seminars and national conferences. Stakeholders are well informed d the policy work and documents being prepared for exhibition.

Formal consultation for the draft Regulation and 'Standards and Best Practice Guidelines' was held between early December 2008 and late February 2009. Public presentations open to all stakeholders were provided in Sydney and Melbourne. A summary document providing clarifications and proposing minor changes to resolve technical details was forwarded to submitters for information and any further comment. Additional stakeholder meetings were also offered to any interested stakeholder.

A Code of Practice, jointly developed by industry and Government, is planned to be finalised in September 2009. The Code of Practice will provide technical guidance on the design, installation, commissioning, operation and maintenance of stage 2 vapour recovery equipment.

Preferred Option

Option 2: VR2 with phased-in compliance

This option is the proposed amendment Regulation. It would phase in VR2 from mid 2010 to 2017 for all Sydney petrol service stations with a petrol throughput greater than 3.5 million litres per year and Newcastle, Wollongong and Central Coast petrol service stations with a petrol throughput greater than 12 million litres per year. This option also requires VR1 compliance by 2014.

The phase-in enables many petrol service stations to install VR2 as part of their scheduled refurbishment program, and allows sufficient lead-time for a planned and orderly introduction of the new technology.

Existing petrol service stations in Sydney below the threshold limit of 3.5 million litres per year, and those in other metropolitan regions of the GMR below the threshold limit of 12 million litres per year, would only be required to install VR2 during construction or major refurbishment. This enables these smaller or more remote petrol service stations to install VR2 with minimal disruption and at least cost to the service station operator. As these petrol service stations account for only a small proportion of regional petrol throughput, the slower adoption of VR2 by them does not significantly delay the VOC emission reduction benefits from VR2.

The total cost of this option is estimated to be $106 million expressed in present value terms over the period till 2040.

The health benefit of this option is estimated to be $231 million expressed in present values terms over the period till 2040. This option also recovers nearly 8 million litres of petrol annually by 2015 and 10 million litres of petrol annually by 2030.

Summary of Stages of regulatory requirements for Petrol Vapour recovery in NSW

<table>
<tr><td>VR2 compliance date for new and newly modified petrol service stations in:
Sydney
Newcastle
Wollongong
Central Coast</td><td>VR1 compliance date for existing petrol service stations in:
Sydney
Illawarra
Lower Hunter
Central Coast</td><td colspan="2">VR2 compliance date for existing petrol service stations in:
Sydney
Newcastle
Wollongong
Central Coast</td></tr>
<tr><td rowspan="3">July 2010</td><td rowspan="3">2014</td><td>Largest petrol service stations
Service station sells more than 12 million litres of petrol per annum</td><td>2014</td></tr>
<tr><td>Medium sized petrol service stations
Service station sells between 3.5 and 12 million litres (Sydney only)</td><td>2017</td></tr>
<tr><td>Smallest petrol service stations
Service station sells less than 3.5 million litres</td><td>None (unless modified)</td></tr>
</table>

Implementation and compliance

DECCW has aimed to establish a VR2 system that encourages compliance and adopts a risk-based approach to enable resources to be targeted to the areas where they are most needed and will prove most effective. The views of stakeholders have been sought to assist development of this system.

VR1 and VR2 compliance will be phased-in from mid 2010 to 2017 according to throughput of the petrol service stations and local government areas and to all new or newly modified petrol service stations in the Greater Metropolitan Region. The phase-in enables many petrol service stations to install VR2 as part of their scheduled refurbishment program, and allows sufficient lead-time for a planned and orderly introduction of the new technology.

Existing petrol service stations in Sydney below the threshold limit of 3.5 million litres per year, and those in other metropolitan regions below the threshold limit of 12 million litres per year, would only be required to install VR2 during construction or major refurbishment. Excluding the smallest petrol service stations from VR2 requirements is based on equity considerations and aims to achieve the greatest pollution reductions while at the same time managing the practical issues around the cost implications for different sized petrol service stations as well as potential community impacts.

The compliance measures DECCW is taking include the release of approved 'Standards and Best Practice Guidelines' which describes the certification details and sets out compliance measures to use. Recommended non-mandatory operational techniques and system testing techniques have been included in the Guidelines. To assist compliance a Code of Practice providing technical guidance in relation to the design, installation, commissioning, operation and maintenance of stage 2 vapour recovery equipment at services stations is to be provided for use by industry.

Industry reporting to DECCW is limited to reporting at system commissioning and exception reporting once the vapour recovery system becomes operational, thereby reducing business compliance costs. Compliance investigations can include random inspections of petrol service stations, random inspection of log books, and targeted inspections and audits of petrol service stations based on EPA records and other sources of information and data. When non-compliance is apparent the operator is given a reasonable time frame to repair and comply.

7. Evaluation and Review

The phased-in compliance option (option 2) is estimated to provide a net benefit of $125 million using the recommended estimate of $4,200 per tonne of VOCs. By comparison, the net benefit of the no compliance date option (option 3) is estimated to be $54 million.

The no compliance date option would minimise the service station operators' costs, but would result in VOC emission reductions occurring at a slower rate. The following table presents the estimated avoided VOC emissions under the three options.

Policy options and associated VOC emission reduction per year (tonnes per year)

Option \ Year	2008	2010	2015	2020	2025	2030	2035	2040	2010 to 2040	Total emission reduction
Option 1 Business as Usual	0	0	0	0	0	0	0	0	0	0
Option 2 Phased VR2 compliance	0	660	4,570	5,990	6,840	7,400	7,850	8,450	6670	206740
Option 3 No VR2 compliance date	0	180	990	1,930	3,030	4,280	5,580	6,880	3220	99770

VOC emission reductions of around 34,000 tonnes per year in the GMR are required to meet national air quality goals and the State Plan priority E3. The above table illustrates the no compliance date option would not meaningfully contribute to VOC emission reductions until around 2020. This option, therefore, does not materially reduce the risks to human health from motor vehicle fuels in the immediate term.

Both options provide a net benefit to society using the damage cost estimate of $4,200 per tonne of VOC. The implementation of VR2 would breakeven with a damage cost of $1,926 per tonne of VOC avoided for phased-in compliance option, and $1,870 per tonne of VOC avoided for the no compliance date option. These breakeven health costs are less than half of the estimate recommended by MMA (2008).

The net benefit to society would be $231 million for the phased-in compliance option and $97 million for the no compliance date option. The phased-in compliance option also meets the objective, while in the immediate term the no compliance date option does not. The additional benefit from a reduction in the exposure of people to benzene in the vicinity of petrol service stations has not been quantified.

The preferred option is the phased-in compliance option (option 2). This option meets the objective of reducing risks to human health and preventing the degradation of the environment by reducing VOC emissions from motor vehicle fuels. It also meaningfully contributes towards meeting national air quality goals and State Plan priority E3, and is estimated to provide a net benefit to society of $125 million over the period till 2040.

The preferred option would amend the *Protection of the Environment Operations (Clean Air) Regulation 2002* under the *Protection of the Environment Operations Act 1997* to phase in compliance of vapour recovery stage 2 at petrol service stations in the NSW GMR.

The Regulation will be reviewed every 5 years in accordance with the *Subordinate Legislation Act 1989*. However, DECCW will undertake to keep in contact and obtain feedback from stakeholders as to the efficacy and efficiency of the Regulation and Guidelines. Both the Guidelines and Industry Code of Practice can be updated in consultation with industry to enhance operation of the regulation if required.

blank page

Gao, Frank F. (DNREC)

From: Gao, Frank F. (DNREC)
Sent: Tuesday, September 30, 2014 8:46 AM
To: Haynes, Robert P (DNREC)
Cc: Ted Tiberi (ttiberi@ARIDtech.com); Fees, David F. (DNREC)
Subject: Arid comment 4-FW: Follow up materials from DE Public Hearing

Bob,
Here is ARID comment 4. Thanks,
Frank

From: Ted Tiberi [mailto:ttiberi@aridtech.com]
Sent: Saturday, September 27, 2014 11:21 AM
To: Kevin Stewart
Cc: luke howard; Gao, Frank F. (DNREC)
Subject: Re: Follow up materials from DE Public Hearing

Hello Kevin,

Many thanks for your response.

Yes; you repeat the key question regarding the interaction of Stage II with ORVR equipped vehicles. I think what has been overlooked by USEPA in this discussion is the category of equipment which has earned CARB (California Air Resource Board) approval as ORVR COMPATIBLE. Please see this link,

http://www.arb.ca.gov/vapor/eo-ORVR.htm

The idea of such gear is to allow efficient operation with simultaneous operation of both Stage II and ORVR vapor recovery techniques. In our view, the key is to actively manage the storage tank pressure to avoid vent & fugitive emissions on the "back-end" while keeping the Stage II gear in place to collect the vehicle refueling emissions on the "front-end". For some reason, the API (American Petroleum Institute) and USEPA seemed to have neglected this option which provides the maximum reductions in vapor emissions, while at the same time providing a viable payback to GDF owner/operators. (SUNOCO's route 95 site in Delaware uses Stage II in conjunction with the ARID Permeator; Wawa has nearly 150 Permeator systems operating within their network, and Costco has about 70 of our systems, earliest one installed in 2005. Permeator earned ORVR Compatibility approval by CARB, TCEQ (Texas), and state of MD, MDE).

As an additional point, it's clear that independent marketers realize that they pay a premium for Stage II vapor recovery hardware, but I am not convinced that their own advocacy groups and/or API have clearly explained to the independent marketers the positive impact of the use of such equipment. The API and independent marketer overall objectives are **not the same**; API represents Big Oil; where Big Oil has been divesting of retail gasoline stations, and they focus on wholesaling fuel to dealers. As such, Big Oil is paid for the volume of fuel delivered by tanker truck, and any evaporative losses are the problem of their customer. The use of Stage II vapor recovery, in conjunction with a back-end vapor processor, allows the independent GDF dealer to use some of the molecules from the **motorist's tank** to help blanket their tank and thereby reduce evaporative losses. In the absence of Stage II, any vapors formed above the fuel in the storage tanks are now derived directly **from liquid fuel owned by the GDF dealer** - these vapors will not travel through the dispenser meter in a liquid phase, and the loss is bourne by the dealer. I don't think the typical GDF dealer has considered this impact.

In addition, by arguing for removal of Stage II requirements, the API and associated advocacy groups are exposing the GDF dealer, employees, and customers to increased health and safety risk from the refueling of non-ORVR vehicles. If API members are not paying for the gear at the retail sites, one would question why API is so strongly arguing for removal of this gear; are they really seeking to sell 0.2% more product to offset evaporation losses ?

Just a few thoughts. Please provide your view. Have a nice weekend in PA.

Best Regards, Ted

Ted Tiberi
ARID Technologies, Inc.
323 S. Hale Street
Wheaton, IL 60187 USA
office: 630.681.8500
mobile: 708.557.0297
ttiberi@ARIDtech.com

On Sep 25, 2014, at 3:56 PM, Kevin Stewart wrote:

Thanks, Ted.

If a picture's worth a thousand words, a video is worth a million.

The movie excellently communicates both
- to the average customer what happens in the absence of vapor recovery
- to the scientist the degree of chaos associated with the fluid dynamics of the emission plume, and so demonstrating why a single sampling location can show time-dependent concentrations that vary considerably.

We support vapor recovery, but the question is how best to do it since we recognize that there will come a point soon in the U.S. where Stage II is net counterproductive once ORVR becomes nearly universal.

Best regards.

Kevin M. Stewart
Director of Environmental Health
American Lung Association of the Mid-Atlantic
Serving the communities of Delaware, New Jersey, Pennsylvania and West Virginia
The Norman P. Hetrick Building
3001 Old Gettysburg Road
Camp Hill, PA 17011
Phone: 717.541.5864 ext. 136

Fax: 888.415.5757
HelpLine: 1-800-LUNG-USA ext. 2
kstewart@lunginfo.org

Improving Life, One Breath at a Time

-----Original Message-----
From: Ted Tiberi [mailto:ttiberi@aridtech.com]
Sent: Tuesday, September 23, 2014 11:44 AM
To: Kevin Stewart
Cc: luke howard; Frank F. (DNREC) Gao
Subject: Follow up materials from DE Public Hearing

Hi Kevin,

I read with interest the Transcript of your comments from the recent DNREC Public Hearing on vapor recovery. My colleague, Luke Howard exchanged business cards with you after the meeting.

We are active now in Australia; where Stage II (VR2) requirements are just coming into use.

I've attached a copy of the DECCW 2009 report from Australian Government which makes a strong case for VR2 implementation. Of particular note, their study has assessed real costs for health impacts and premature death due to toxics exposure. I have attached also a FLIR (Forward Looking Infrared) video showing qualitative impact of Non Stage II, Non ORVR refueling event on the motorist. I have also a attached an objective Finnish study which quantitatively shows the impact of Stage II vs Non Stage II refueling emissions on the motorist. (both cases are for Non ORVR scenario). Perhaps the Lung Association is interested in these adverse, negative impacts of removing Stage II and of neglecting Continuous Pressure Monitoring and/or Pressure Management technologies.

Please advise if I can provide any additional information on the topic of GDF (gasoline dispensing facility) vapor losses.

Best Regards, Ted

blank page

Gao, Frank F. (DNREC)

From: Gao, Frank F. (DNREC)
Sent: Tuesday, September 30, 2014 8:47 AM
To: Haynes, Robert P (DNREC)
Cc: Ted Tiberi (ttiberi@ARIDtech.com); Fees, David F. (DNREC)
Subject: Arid comment 5-FW: Proposal to Monitor Pressure at a GDF

Bob,
Here is ARID comment 5. Thanks,
Frank

From: Ted Tiberi [mailto:ttiberi@aridtech.com]
Sent: Saturday, September 27, 2014 12:15 PM
To: Fees, David F. (DNREC)
Cc: Gao, Frank F. (DNREC); Amirikian, Ronald A. (DNREC); Jacobs, Michelle V. (DNREC); luke howard
Subject: Re: Proposal to Monitor Pressure at a GDF

Hi Dave,

Thanks for your latest note.

For the 7 Wawa stations in Delaware with PERMEATOR units, we have been recording and storing pressure data since 2005 (Claymont, DE; first site installed). We have an extensive data set on Stage II pressure profile, as a function of ORVR penetration, and with and without PERMEATOR operation. However, it seems to me that the current focus is on Non-Stage II pressure profiles, as evidenced by the comments made by Stakeholders at your recent Public Hearing.

Since the fundamental dynamics of pressure vs time are much different for Stage II vs. Non Stage II systems, it seems that CPM testing on Non Stage II GDF would be much more appropriate. With a ready-made situation to generate actual data from Non-Stage II GDF in Delaware, and since the viability of CPM depends so strongly on the actual tank pressure performance of Non Stage II GDF, and since we have a willing and ready GDF volunteering to make such tests, why would Delaware delay in expediting a favorable decision to proceed with such data gathering ? Data gathering on Non Stage II GDF is the key to quantifying the storage tank emissions, calculating the associated fuel savings and determining the ultimate viability for CPM and possible pressure management hardware.

Can you please clarify your reluctance to rapidly move forward with a data gathering effort for Non Stage II GDF in Delaware ?

Best Regards, Ted

Ted Tiberi
ARID Technologies, Inc.
323 S. Hale Street
Wheaton, IL 60187 USA
office: 630.681.8500

mobile: 708.557.0297
ttiberi@ARIDtech.com

On Sep 26, 2014, at 11:03 AM, Fees, David F. (DNREC) wrote:

Ted,

I received word from Frank Gao that you are interested in monitoring pressure at a GDF in Delaware with Stage II turned off. Since you are seeking to read pressure, and since we are not able to allow Stage II to be turned off without providing for some type of enforcement discretion, we would ask that you test your pressure monitoring system with the GDFs as they are currently configured. We have always wondered why no pressure data were recorded for the systems that are already in place at the 7 Wawa stations in Delaware.

Regards,

Dave

David F. Fees, P.E.
Managing Engineer
Emission Inventory Development Program
Division of Air Quality, DNREC
tel. (302) 739-9402, fax (302) 739-3106
e-mail: david.fees@state.de.us

Blue Skies Delaware; Clean Air for Life

Gao, Frank F. (DNREC)

From: Gao, Frank F. (DNREC)
Sent: Tuesday, September 30, 2014 8:49 AM
To: Haynes, Robert P (DNREC)
Cc: Ted Tiberi (ttiberi@ARIDtech.com); Fees, David F. (DNREC)
Subject: Arid comment 6-FW: Proposal to Monitor Pressure at a GDF

Bob,
Here is ARID comment 6. Thanks,
Frank

From: Ted Tiberi [mailto:ttiberi@aridtech.com]
Sent: Saturday, September 27, 2014 12:20 PM
To: Gao, Frank F. (DNREC)
Cc: Fees, David F. (DNREC); Amirikian, Ronald A. (DNREC); luke howard
Subject: Re: Proposal to Monitor Pressure at a GDF

Hi Frank,

Thanks for your follow on mail.

We do have this data from GDF sites in PA, Michigan, Oregon and FLA. We have already shared data from two such sites with you, Dave and DNREC.

Shall I resend the data. (please recall the data set referenced prior to our phone conference; this same data set was referenced in the spreadsheet I submitted which quantified the storage tank vent emissions).

It seems from your public meeting however, that Stakeholders will discount any data that is not generated in the state of Delaware ?

Please advise.

Thanks and Regards, Ted

Ted Tiberi
ARID Technologies, Inc.
323 S. Hale Street
Wheaton, IL 60187 USA
office: 630.681.8500
mobile: 708.557.0297
ttiberi@ARIDtech.com

On Sep 26, 2014, at 12:25 PM, Gao, Frank F. (DNREC) wrote:

Dave,
Thanks for replying to Ted.

Ted,
I would add that if you could conduct any pressure monitoring test at a GDF outside DE, where you have installed your PERMEATOR and can have its Stage II turned off, we would be very interested in seeing the test results, i.e., the pressure profile.
Thank you for your continuous interest in DE's air quality issues.

Frank

From: Fees, David F. (DNREC)
Sent: Friday, September 26, 2014 12:03 PM
To: Ted Tiberi
Cc: Gao, Frank F. (DNREC); Amirikian, Ronald A. (DNREC)
Subject: Proposal to Monitor Pressure at a GDF

Ted,

I received word from Frank Gao that you are interested in monitoring pressure at a GDF in Delaware with Stage II turned off. Since you are seeking to read pressure, and since we are not able to allow Stage II to be turned off without providing for some type of enforcement discretion, we would ask that you test your pressure monitoring system with the GDFs as they are currently configured. We have always wondered why no pressure data were recorded for the systems that are already in place at the 7 Wawa stations in Delaware.

Regards,

Dave

David F. Fees, P.E.
Managing Engineer
Emission Inventory Development Program
Division of Air Quality, DNREC
tel. (302) 739-9402, fax (302) 739-3106
e-mail: david.fees@state.de.us

Blue Skies Delaware; Clean Air for Life

Gao, Frank F. (DNREC)

From: Gao, Frank F. (DNREC)
Sent: Tuesday, September 30, 2014 8:51 AM
To: Haynes, Robert P (DNREC)
Cc: Ted Tiberi (ttiberi@ARIDtech.com); Fees, David F. (DNREC)
Subject: Arid comment 7-FW: Proposal to Monitor Pressure at a GDF
Attachments: Logic of Vapor Generation and Vapor Monitoring.pdf

Bob,
This is ARID comment 7. Thanks,
Frank

From: Ted Tiberi [mailto:ttiberi@aridtech.com]
Sent: Tuesday, September 30, 2014 8:34 AM
To: Gao, Frank F. (DNREC)
Cc: Fees, David F. (DNREC); Haynes, Robert P (DNREC)
Subject: Re: Proposal to Monitor Pressure at a GDF

Hi Frank,

Please include the attached file as well.

Thanks and Regards, Ted

ps can you please confirm receipt of this request ?

Ted Tiberi
ARID Technologies, Inc.
323 S. Hale Street
Wheaton, IL 60187 USA
office: 630.681.8500
mobile: 708.557.0297
ttiberi@ARIDtech.com

On Sep 30, 2014, at 7:26 AM, Gao, Frank F. (DNREC) wrote:

Hi Ted,
We will enter your correspondence of 9/18, 9/22, 9/23, 9/27 (3) to the hearing records.

Hi Bob,
I will forward to you the correspondences from ARID Technologies, Inc. for the hearing records for the revision to 7 DE Admin Code 1124 Section 36.0 "Stage II Vapor Recovery" (the hearing was held on 08/28/2014). Please see Mr. Tiberi's request below.

Thanks,

Frank

From: Fees, David F. (DNREC)
Sent: Monday, September 29, 2014 11:25 AM
To: Ted Tiberi
Cc: Gao, Frank F. (DNREC); Amirikian, Ronald A. (DNREC); Jacobs, Michelle V. (DNREC); luke howard
Subject: RE: Proposal to Monitor Pressure at a GDF

Ted,

Thanks for your comments, which we will submit to the hearing officer to be entered into the record. We are evaluating all comments in preparing our response to the hearing officer. If you would like to submit the pressure data from the Wawa sites in Delaware, please submit them to Frank or me by close of business on October 6th.

Dave

David F. Fees, P.E.
Managing Engineer
Emission Inventory Development Program
Division of Air Quality, DNREC
tel. (302) 739-9402, fax (302) 739-3106
e-mail: david.fees@state.de.us

Blue Skies Delaware; Clean Air for Life

From: Ted Tiberi [mailto:ttiberi@aridtech.com]
Sent: Monday, September 29, 2014 10:22 AM
To: Fees, David F. (DNREC)
Cc: Gao, Frank F. (DNREC); Amirikian, Ronald A. (DNREC); Jacobs, Michelle V. (DNREC); luke howard
Subject: Re: Proposal to Monitor Pressure at a GDF

Hi Dave,

Thanks for your latest note. My response attached. I look forward to your reply.

Frank, please enter all of my recent correspondence as part of our "Public Comments" into the record on this matter. (9/18, 9/22, 9/23, 9/27 (3))

Thanks and Best Regards, Ted

Ted Tiberi
ARID Technologies, Inc.
323 S. Hale Street
Wheaton, IL 60187 USA
office: 630.681.8500
mobile: 708.557.0297
ttiberi@ARIDtech.com

On Sep 27, 2014, at 8:04 PM, Fees, David F. (DNREC) wrote:

Ted,

You misunderstand the reasons for monitoring pressure. The purpose for Delaware requiring continuous pressure monitoring is to ensure the vapor system does not exceed the acceptable leak rate as provided for in the proposed regulation. In addition, The CPM will monitor pressure to determine when venting is occurring to determine if venting exceeds the allowable time set in the proposed regulation. CPM can accomplish these determinations on either a Stage II or Stage I only GDF.

Regards,

Dave

From: Ted Tiberi [ttiberi@aridtech.com]
Sent: Saturday, September 27, 2014 12:15 PM
To: Fees, David F. (DNREC)
Cc: Gao, Frank F. (DNREC); Amirikian, Ronald A. (DNREC); Jacobs, Michelle V. (DNREC); luke howard
Subject: Re: Proposal to Monitor Pressure at a GDF

Hi Dave,

Thanks for your latest note.

For the 7 Wawa stations in Delaware with PERMEATOR units, we have been recording and storing pressure data since 2005 (Claymont, DE; first site installed). We have an extensive data set on Stage II pressure profile, as a function of ORVR penetration, and with and without PERMEATOR operation. However, it seems to me that the current focus is on Non-Stage II pressure profiles, as evidenced by the comments made by Stakeholders at your recent Public Hearing.

Since the fundamental dynamics of pressure vs time are much different for Stage II vs. Non Stage II systems, it seems that CPM testing on Non Stage II GDF would be much more appropriate. With a ready-made situation to generate actual data from Non-Stage II GDF in Delaware, and since the viability of CPM depends so strongly on the actual tank pressure performance of Non Stage II GDF, and since we have a willing and ready GDF volunteering to make such tests, why would Delaware delay in expediting a favorable decision to proceed with such data gathering ? Data gathering on Non Stage II GDF is the key to quantifying the storage tank emissions, calculating the associated fuel savings and determining the ultimate viability for CPM and possible pressure management hardware.

Can you please clarify your reluctance to rapidly move forward with a data gathering effort for Non Stage II GDF in Delaware ?

Best Regards, Ted

Ted Tiberi
ARID Technologies, Inc.
323 S. Hale Street
Wheaton, IL 60187 USA
office: 630.681.8500

mobile: 708.557.0297
ttiberi@ARIDtech.com

On Sep 26, 2014, at 11:03 AM, Fees, David F. (DNREC) wrote:

Ted,

I received word from Frank Gao that you are interested in monitoring pressure at a GDF in Delaware with Stage II turned off. Since you are seeking to read pressure, and since we are not able to allow Stage II to be turned off without providing for some type of enforcement discretion, we would ask that you test your pressure monitoring system with the GDFs as they are currently configured. We have always wondered why no pressure data were recorded for the systems that are already in place at the 7 Wawa stations in Delaware.

Regards,

Dave

David F. Fees, P.E.
Managing Engineer
Emission Inventory Development Program
Division of Air Quality, DNREC
tel. (302) 739-9402, fax (302) 739-3106
e-mail: david.fees@state.de.us

Blue Skies Delaware; Clean Air for Life

Logic of Vapor Generation and Vapor Monitoring

You state that CPM is used for two things; namely (1) determining if a vapor leak rate is less than some specified value, and (2) determining if venting time is greater than some specified % of the time.

The Stakeholder's at your Public Hearing claim that their storage tanks remain at negative pressure 100% of the time, and they claim to experience **zero emissions** of hydrocarbons from their storage tanks.

They cannot understand the need for measuring vapor leak rates or storage tank pressure profiles since they claim that their tanks are always under vacuum (negative pressure).

At the same time, DNREC is tasked with making a decision on potentially requiring the use of hardware & software which will have financial impacts on GDF owners and health and safety impacts for GDF employees, customers and members of the Community.

Under this backdrop, it seems that Continuous Pressure Monitoring can be used for multiple purposes. Namely, the claims of the Stakeholder's can be supported or challenged, the magnitude of the emissions can be quantified, and the vapor leak rate and venting time can be characterized.

Let's first review a few fundamental concepts:

- Within fuel storage tanks, air ingestion causes a certain vapor generation rate
    - For Stage II GDF, in conjunction with the refueling of ORVR equipped vehicles, this vapor generation rate causes positive pressures primarily during busy pumping periods
    - For Non Stage II GDF, this vapor generation rate causes positive pressures primarily during slow pumping periods, or during times that the GDF is closed
- The root cause of the observed increase in storage tank pressure is the vapor generation rate
    - A "tight" GDF will experience vent emissions at the cracking pressure of the P/V valve
    - A "leaky" GDF will experience less vent emissions through the P/V valve, but more emissions through "fugitive" losses
    - The Total Vapor Losses = Vent Emissions + Fugitive Emissions
    - The Total Vapor Losses are a function of the vapor generation rate of the system
        - The P/V valve does not "magically stop the vent losses", it allows the pressure to increase to the cracking pressure of the

P/V valve, and provides a small "buffer" for vapor storage before the vapors are exhausted to the atmosphere
        - The fugitive emissions are a function of the storage tank pressure profile (time at given pressure intervals) and can readily be quantified by using the CARB fugitive emissions correlation; a higher average storage tank pressure translates into higher fugitive emissions
- A vapor processor is one means used to actively manage or control storage tank pressure, while at the same time containing hydrocarbon vapors within the storage tank system and thereby reducing hydrocarbon vapor emissions
- By Quantifying the vapor generation rate, the hydrocarbon vapor losses, can be measured, and various means to reduce such emissions can be compared to the magnitude of the emissions reduced
    - The magnitude of the emissions; tons/year-GDF can be quantified
        - These figures can help quantify DE's Emissions Inventory
    - A cost per ton of emissions reduced can be tabulated
    - A fuel savings figure can be quantified
    - A payback on vapor processor hardware can be calculated
- As a practical matter, the leak decay equation you reference from CARB is based on Stage II GDF, with no ORVR. This equation does not apply to a Non Stage II GDF, this equation can perhaps be modified to apply, with additional calculations or algorithm modifications, but the use of this equation in its current form is for "static pressure decay tests", where vapor growth rates are assumed to be negligible; clearly this is not the case for the Stage II case with ORVR, or the Non Stage II (Stage I only) GDF case. The equation is for a classical "pressure decay" without any vapors being generated within the system; for example, nitrogen gas leaking from the headspace of a water storage tank; not hydrocarbon vapors leaking from a tank while at the same time vapors are being formed from the liquid phase hydrocarbon. We have confirmed these facts with CARB's John Marconi. Please contact John directly to discuss at john.marconi@arb.ca.gov
- We have proposed measuring Non Stage II pressure profiles from a GDF in Delaware. You state enforcement discretion is required to move forward with this type of test. Can you please advise on what sort of mechanism can be followed for a specific site (not industry wide) to temporarily disconnect (not permanently) their Stage II system for purpose of a field test designed to provide key inputs for DNREC's decision-making process? We are not very familiar with the formal Regulatory Framework in Delaware. Perhaps you have knowledge of past examples where DNREC has power to provide temporary relief from existing standards in order to collect important data used in formulating future Regulatory requirements. Are you saying that DNREC has no way to help accelerate a data gathering effort on Non Stage II GDF in Delaware? Are DNREC and the Hearing Officer moving forward with decision making before gathering actual data from Non Stage II GDF in Delaware?

B5 (2 pgs)

Gao, Frank F. (DNREC)

From: Alan Muller <amuller@dca.net>
Sent: Sunday, October 05, 2014 5:13 PM
To: Mirzakhalili, Ali (DNREC)

Dear Ali:

It has taken me longer than I'd hoped to get my thoughts together on the vapor recovery rulemaking. But, it was put on my mental radar screen very recently, and is not a simple subject.

Overall, I think there is a compelling case for not just letting Stage II be shut down.

I base this on the points Ron and Frank make, but additional ones also. For example:

Note this from the two "break-even calculations" provided:

2009 data:

highway gas 489,199
non-highway 24,659

2012 data:

highway gas 466,603
non-highway 27,977

The highway use decreased and the non-highway increased. This may or may not be a long-term trend, but if the fuel economy standards hold it should be. I assume non-highway use--granting that it is only about five percent of total usage--is characterized by filling of uncontrolled tanks and so on. So the gas station people might be right in their critique of rising gasoline sales trends based on population or housing demographics. But it seems to me this is an argument for revising Stage II for compatibility with ORVR, so as not to give up control of off-highway tank and container filling. Stage II will provide some (how much?) control of non-highway vapor emissions.

It seems very relevant that handling gasoline exposes people to various toxins such as benzene. Therefore, minimizing these exposures, and resulting health impacts, should be considered a priority in addition to the concern of VOC contributions to ozone formation. The gas station people, at least in their public hearing testimony, display a noticeable indifference to the health of their employees and customers.

Based on personal observation, I question the effectiveness of the nozzle/filler neck seal on ORVR systems. The claim seems to be that the annular space is filled with a liquid seal, but in my experience one sees and smells vapor spilling out. Without positive pressure in the tank, the displaced vapor will not enter the on-board canister. Has the DNREC looked at this question?

The info presented seems to make clear that the present Stage II systems need more frequent inspection and maintenance. ("... a survey conducted during the development of the proposed regulatory revision indicated a majority of gas stations needed maintenance in order to pass the annual tank tightness test.") Leaking systems

likely cause some occupational exposures. So, the proposal for a continuous pressure monitor (CPM) requirement makes sense whether Stage II is retained or only a pressure monitoring system is required. I do not see merit in the objections of the gas station interests to CPM. They are protesting too much.

The literature seems to indicate that some Stage II systems are "compatible" with ORVR, and some are not. Some can be modified to become so. For example, by making systems smart enough to distinguish between saturated vapor and air. Such compatibility enhancements or retrofits are commercially available.

The gas station people argue that the pressure in the tanks is likely to remain negative due to the dispensing of liquid from the pumps and the non-return of vapor. This may be, or might be if liquid withdrawal was constant, but if the system is not vapor tight one may expect ingress of air and resulting vapor expansion. So, again, the continuous pressure monitoring is needed.

Therefore, sound public policy is to retain and modify Stage II vapor recovery, as necessary, to make it compatible with ORVR. An inferior alternative, the one now proposed by the Department, would allow the shutdown of Stage II vapor recovery but enact a continuous pressure monitoring requirement. The least desirable alternative would be the one apparently desired by the industry: Simple shutdown of State II. We are aware that this alternative has been adopted by some states, and apparently is allowed by the EPA rulemaking in this matter. However, Delaware usually tries to do a little better in air quality management than the minimum of federal requirements and the desirability of doing so in this case seems well-established.

I will send more comprehensive comments to Mr. Haynes but would like to discuss a few things with staff first.

Yours very truly,

Alan Muller

Alan Muller, Executive Director
Green Delaware
Box 69
Port Penn, DE 19731 USA
302.834.3466
cell 302.299.6783
greendel@dca.net
www.greendel.org

B6 (31 pgs)

Gao, Frank F. (DNREC)

From: Ted Tiberi <ttiberi@aridtech.com>
Sent: Monday, October 06, 2014 10:45 AM
To: Gao, Frank F. (DNREC)
Cc: Luke Howard
Subject: Additional Submittal
Attachments: Attribute Chart rev1.pdf; Pressure, Run Time Data Stage II and no Stage II GDF, USA.pdf

Dear Frank,

I attach additional information for ARID's submittal into the record on your recent Public Hearing.

We show pressure vs time plots with and without Stage II and with and without Permeator, ARID's vapor processor. This data includes SUNOCO and WAWA sites located in Delaware.

We show also the "Attribute Matrix" showing impact on GDF and environment under three scenarios; removal of Stage II with sole reliance on ORVR, enhanced Stage I and Stage II with processor, and remove Stage II, and enhance Stage I with processor.

I am pleased to walk you and DNREC staff through the slides and provide answers to any questions you may have.

Sincerely, Ted

Ted Tiberi
ARID Technologies, Inc.
323 S. Hale Street
Wheaton, IL 60187 USA
office: 630.681.8500
mobile: 708.557.0297
ttiberi@ARIDtech.com

Blank page

Stage II, ORVR and Vapor Processor Attribute Matrix

Ted Tiberi, ARID Technologies, Inc., www.ARIDtech.com, 12 September 2013

Attribute	(A) Decommission Stage II with sole reliance on ORVR	(B) Enhance Stage II & Stage I with Processor	(C) Decommission Stage II & Enhance Stage I with Processor	Comments
Refueling Emissions	Increase	Decrease	Increase	A = C
Storage Tank Emissions [1]	Increase	Decrease	Decrease	B ≈ C
Soil/Groundwater Contamination	Increased Risk	Decreased Risk	Decreased Risk	
Vapor Intrusion	Increased Risk	Decreased Risk	Decreased Risk	
Adverse Health Effects	Increased Risk	Decreased Risk	Somewhat Decreased	A > C > B
Ozone Formation Impact	Increased	**Decreased**	Decreased	C > B
EJ Burden of Refueling Emissions	YES	NO	YES	
Premature Retiring of Useful Assets	YES	NO	YES	
Decommissioning Expense	YES	NO	YES	
Future Expense Burden of Premium Hardware [2]	YES	NO	YES	
Continuous Pressure Monitoring Expense	YES	NO [3]	NO	
Conservation of Fossil Fuels	NO	**YES**	YES	B > C
Energy Savings	NO	**YES**	YES	B >C
Net Present Value (Saved Fuel – Expense) [4]	Negative	**Positive**	Positive	B > C B ≈ C [5]
GDF Incentive to maintain "tight site"	NONE	LARGE	LARGE	
Non-Road Emissions Impact [6]	Increased	**Decreased**	Increased	A = C
Utility of Continuous Pressure Monitoring	NONE	LARGE	LARGE	
GDF Product/Service Differentiation	NONE	LARGE	LARGE	

[1] Includes emissions during bulk tanker loading and in the interval between tanker deliveries

[2] Dripless Nozzles, low permeation hoses, continuous pressure monitoring

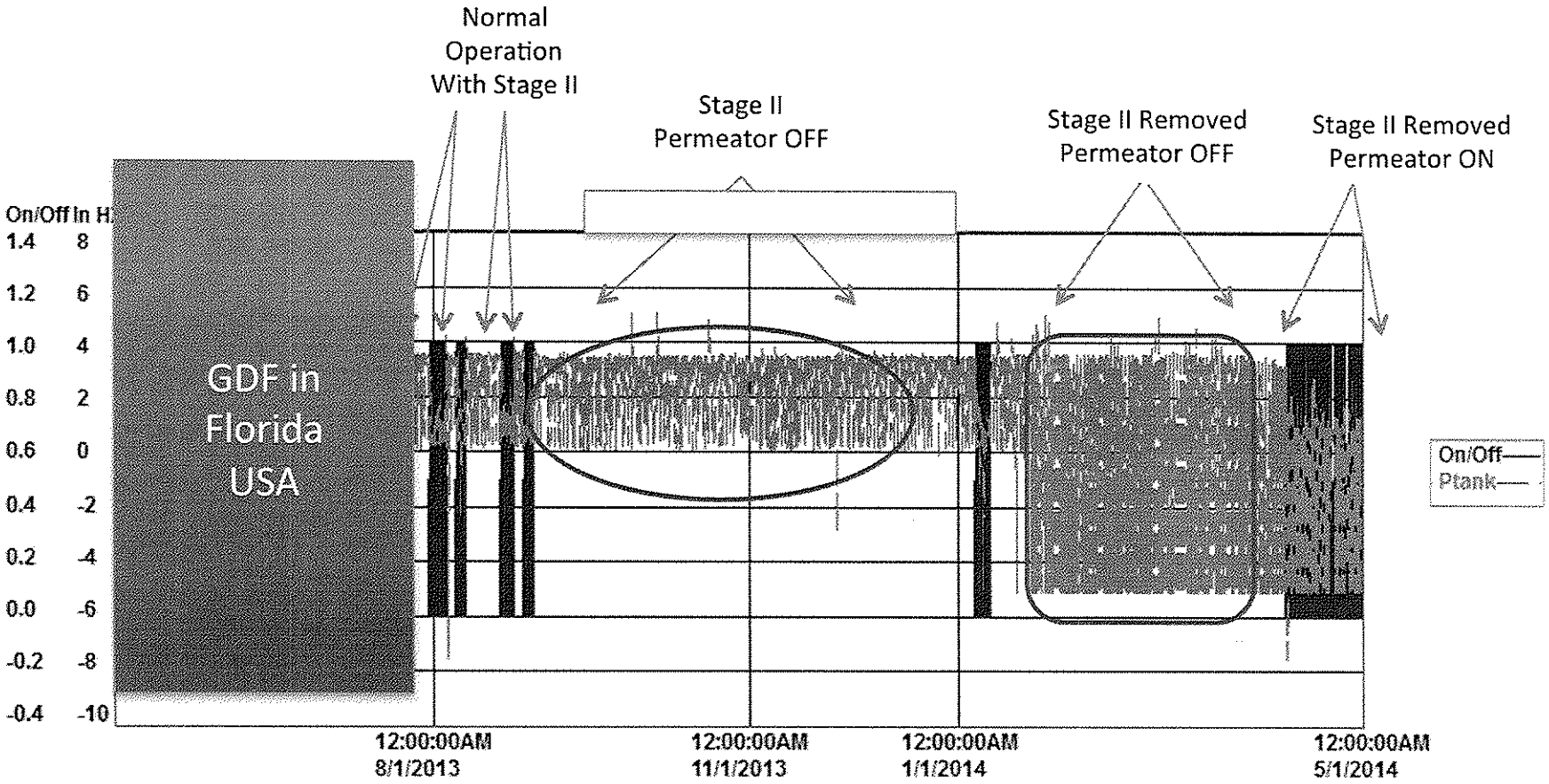
[3] Included with ARID processor

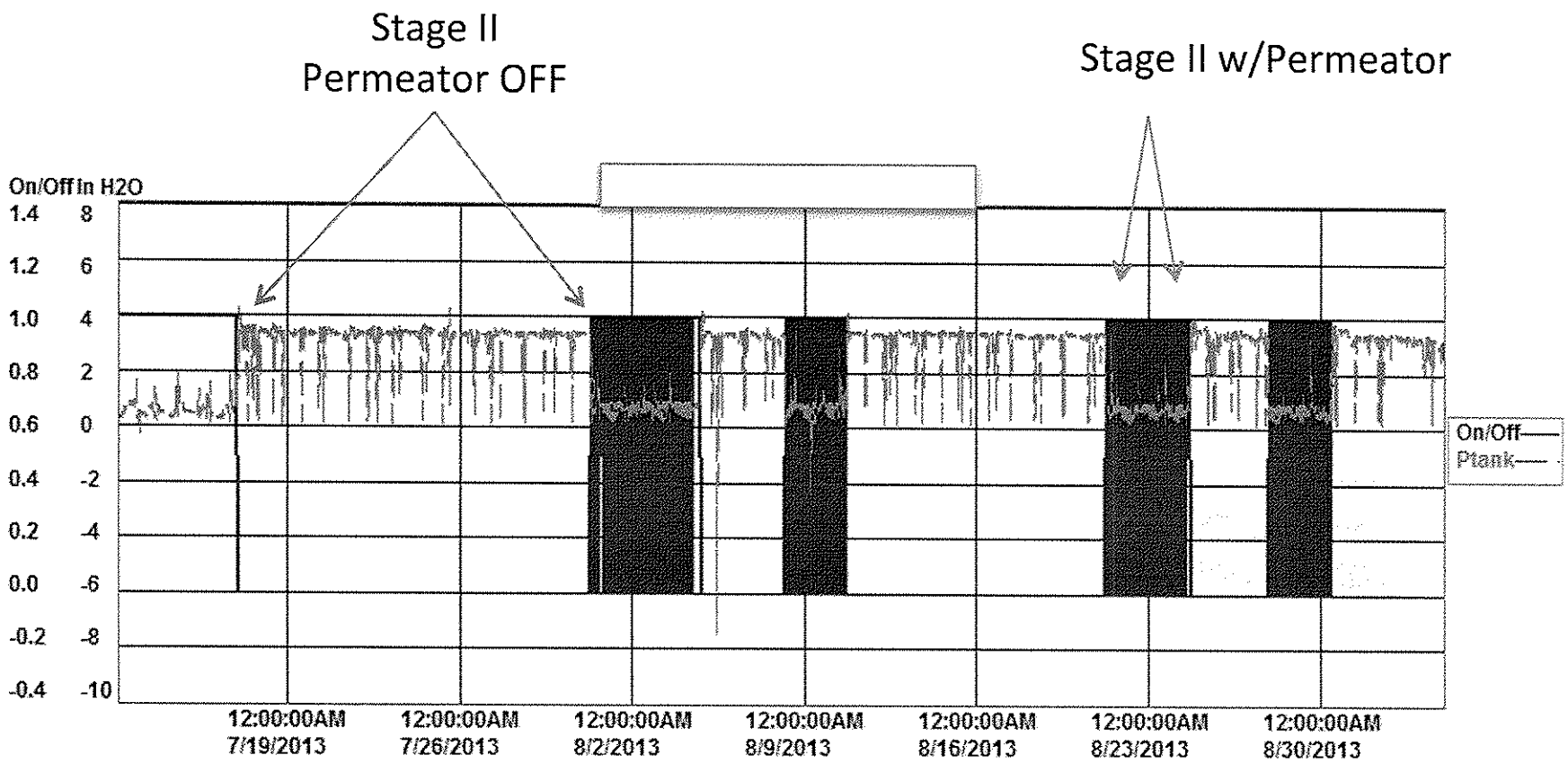
[4] Capital equipment purchase and "shared savings business model" available

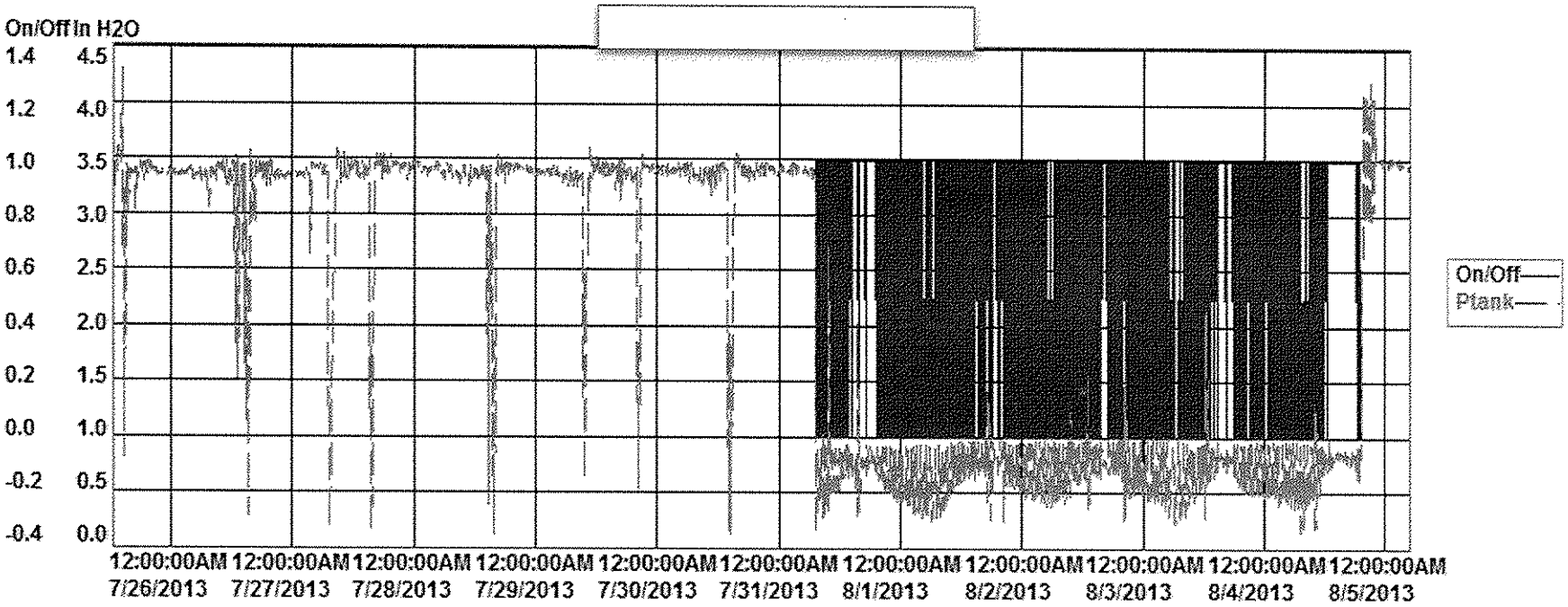
[5] Need to confirm with field testing; savings = f (RVP, Temp, V/L, GDF Flow Profile)

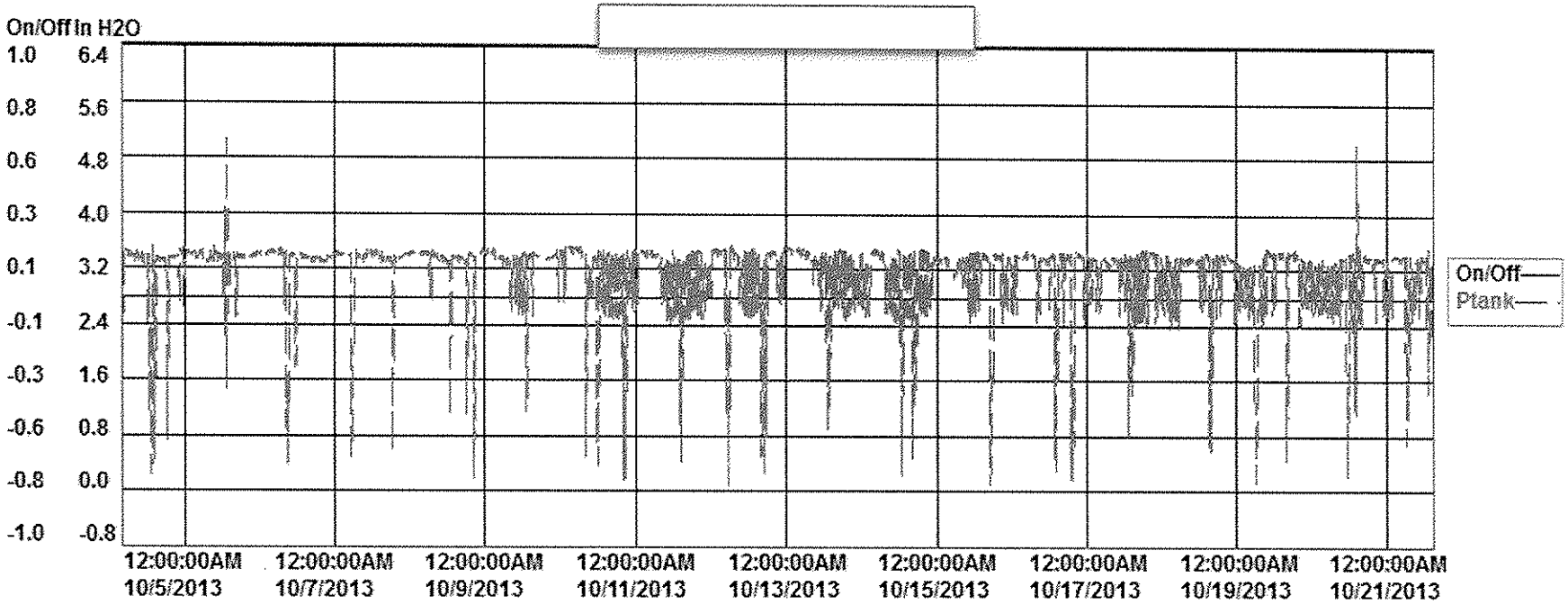
[6] Non-Road emissions generated during refueling of gas cans, motorcycles, boats, snowmobiles; ORVR will never be used on these tanks

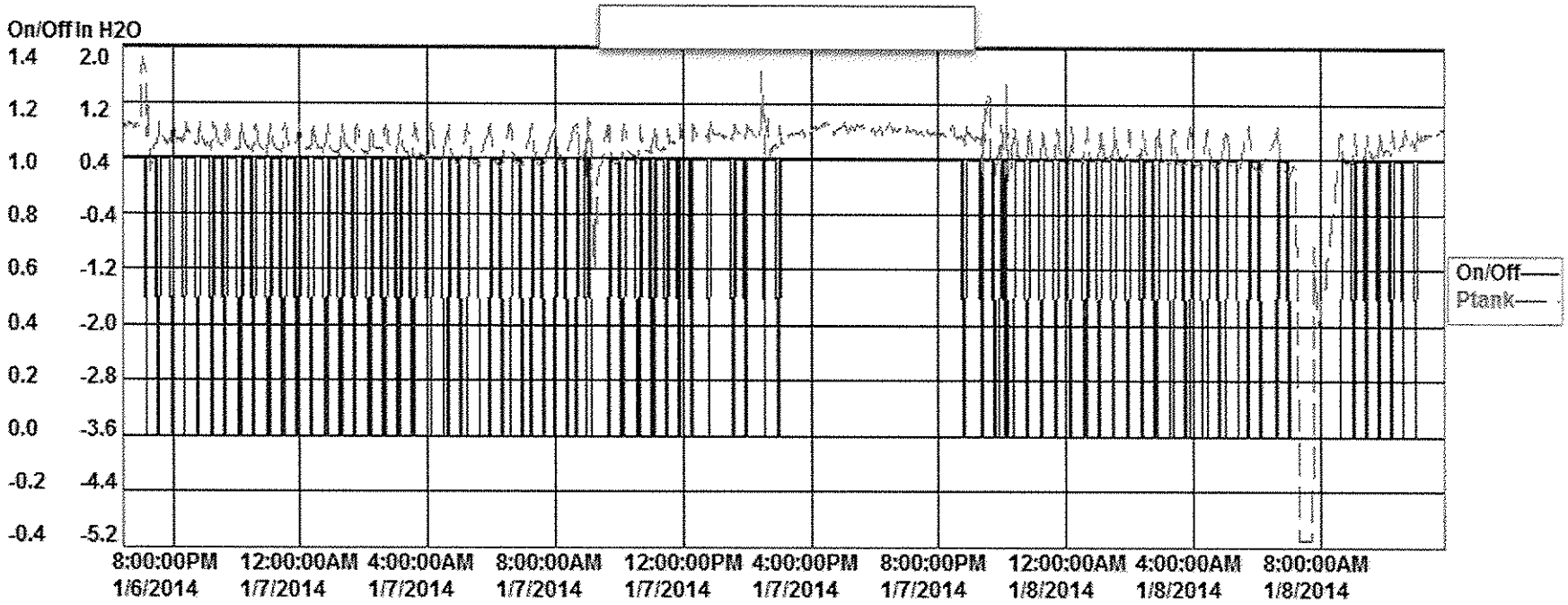
blank page

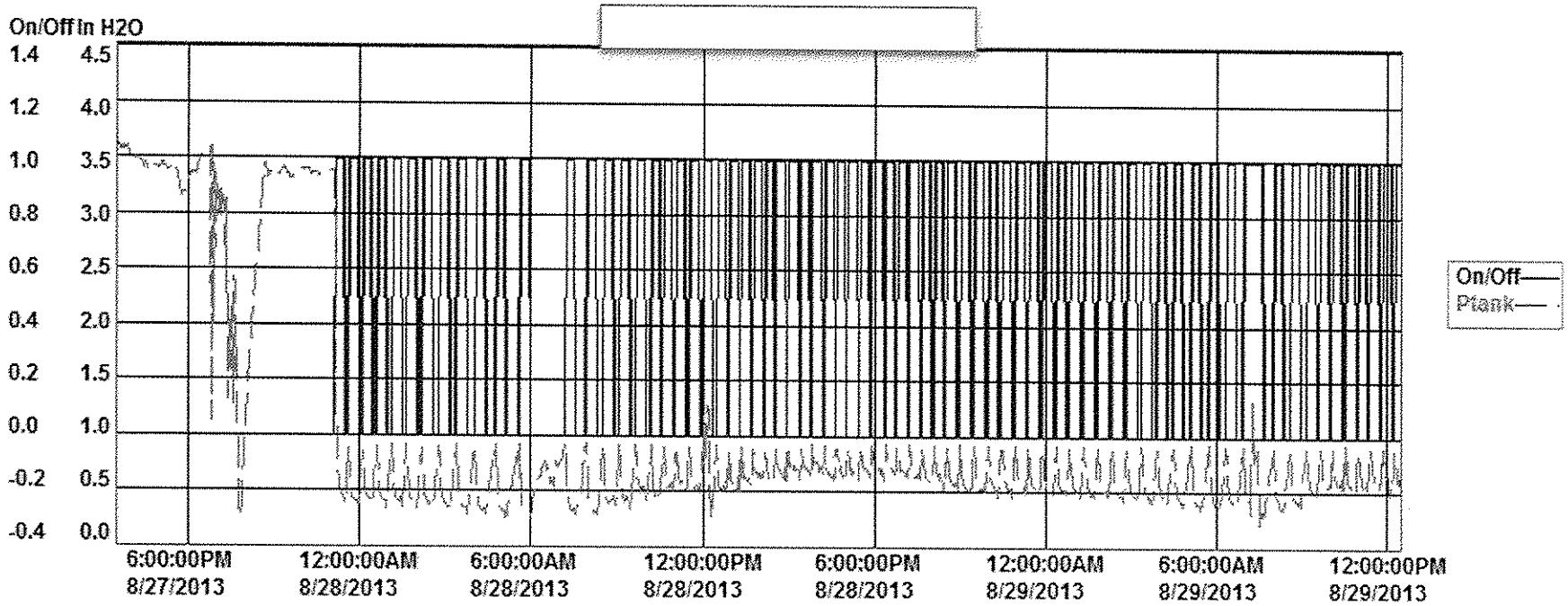

Normal
Operation
With Stage II
Stage II
Permeator OFF
Stage II Removed
Permeator OFF
Stage II Removed
Permeator ON
GDF in
Florida
USA
On/Off In H
1.4 8
1.2 6
1.0 4
0.8 2
0.6 0
0.4 -2
0.2 -4
0.0 -6
-0.2 -8
-0.4 -10
12:00:00AM
8/1/2013
12:00:00AM
11/1/2013
12:00:00AM
1/1/2014
12:00:00AM
5/1/2014
On/Off
Ptank

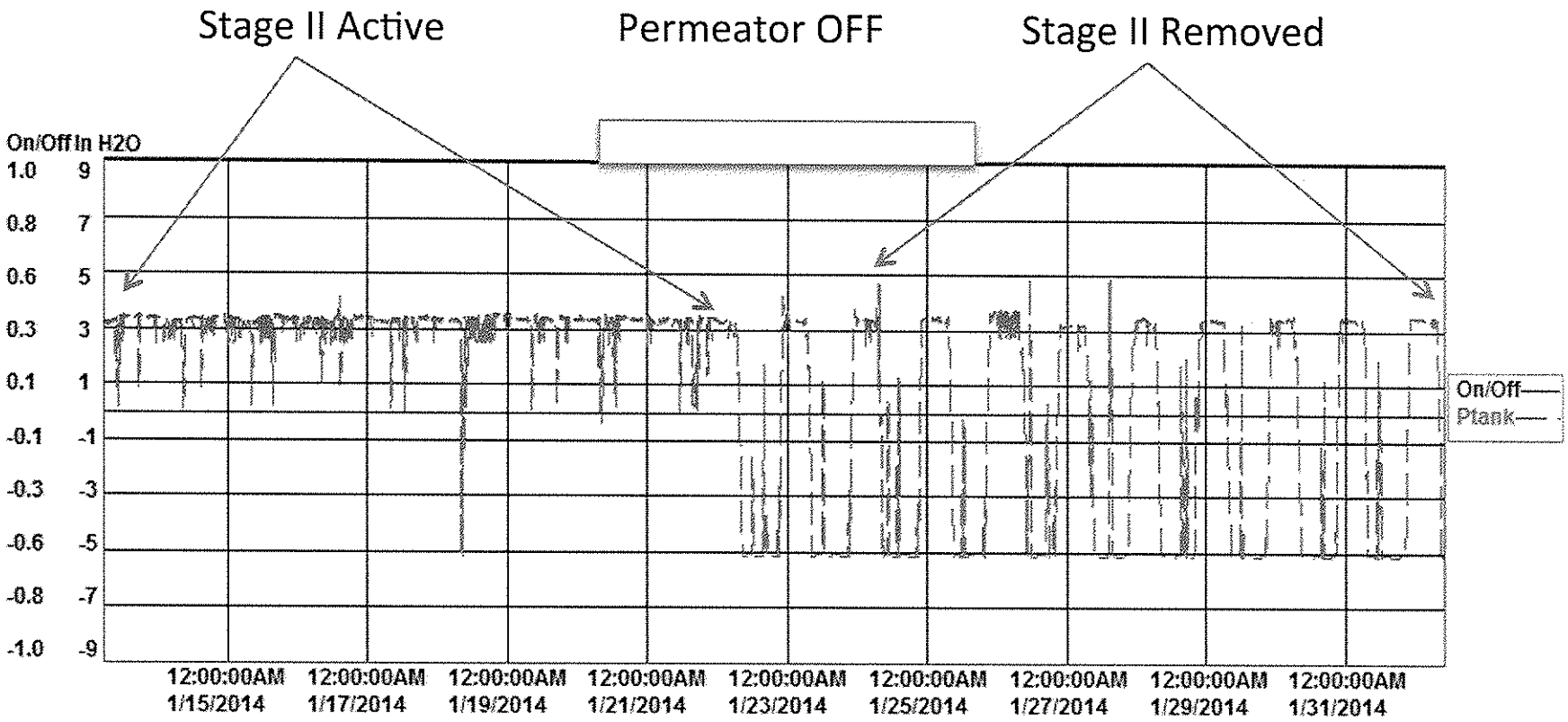



On/Off In H2O
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
12:00:00AM 7/26/2013
12:00:00AM 7/27/2013
12:00:00AM 7/28/2013
12:00:00AM 7/29/2013
12:00:00AM 7/30/2013
12:00:00AM 7/31/2013
12:00:00AM 8/1/2013
12:00:00AM 8/2/2013
12:00:00AM 8/3/2013
12:00:00AM 8/4/2013
12:00:00AM 8/5/2013
On/Off
Plank

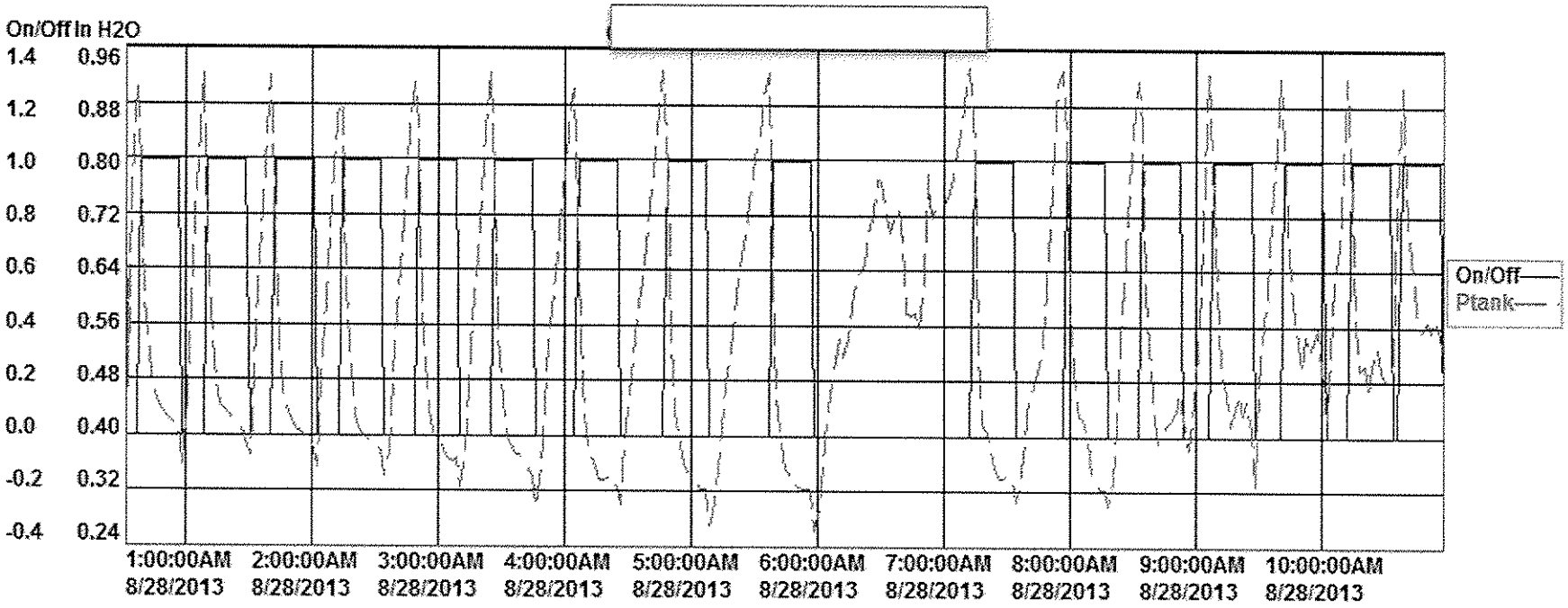

On/Off In H2O
1.0
0.8
0.6
0.3
0.1
-0.1
-0.3
-0.6
-0.8
-1.0
6.4
5.6
4.8
4.0
3.2
2.4
1.6
0.8
0.0
-0.8
12:00:00AM 10/5/2013
12:00:00AM 10/7/2013
12:00:00AM 10/9/2013
12:00:00AM 10/11/2013
12:00:00AM 10/13/2013
12:00:00AM 10/15/2013
12:00:00AM 10/17/2013
12:00:00AM 10/19/2013
12:00:00AM 10/21/2013
On/Off
Plank




On/Off In H2O
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
6:00:00PM 8/27/2013
12:00:00AM 8/28/2013
6:00:00AM 8/28/2013
12:00:00PM 8/28/2013
6:00:00PM 8/28/2013
12:00:00AM 8/29/2013
6:00:00AM 8/29/2013
12:00:00PM 8/29/2013
On/Off
Plank



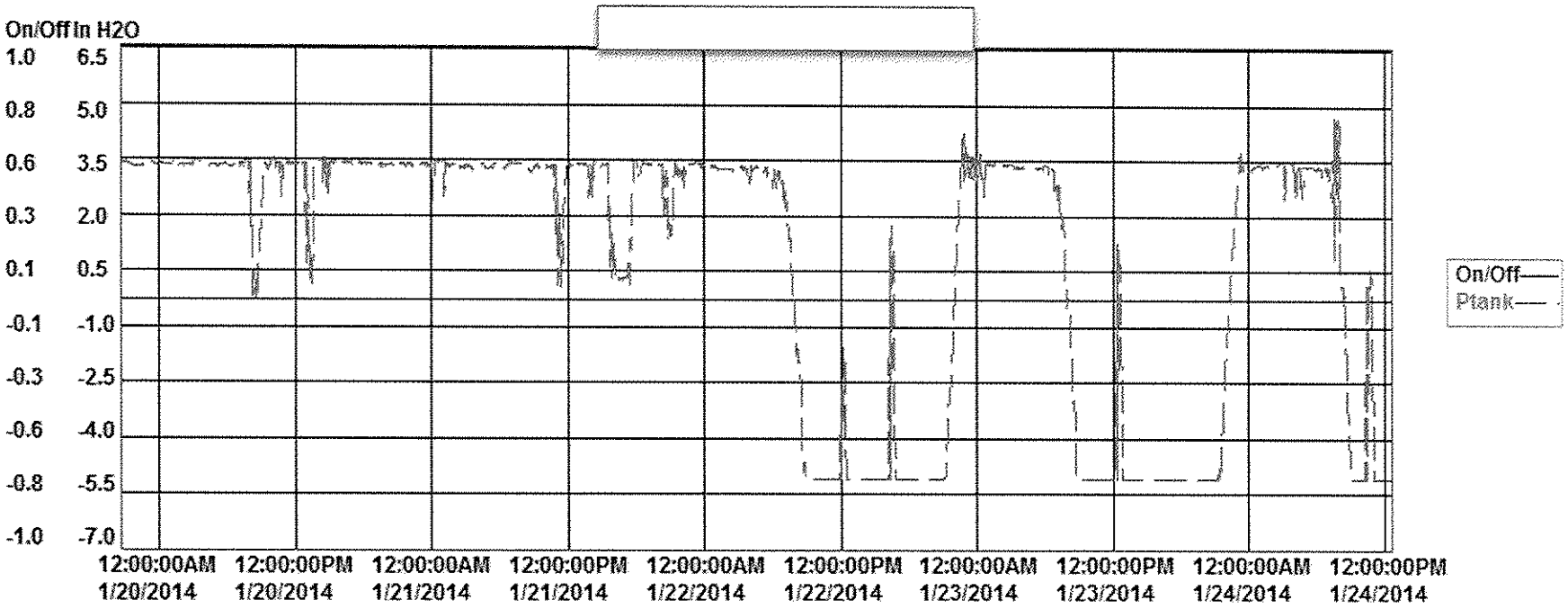
Stage II Active with Permeator
Avg Run Time = 51%

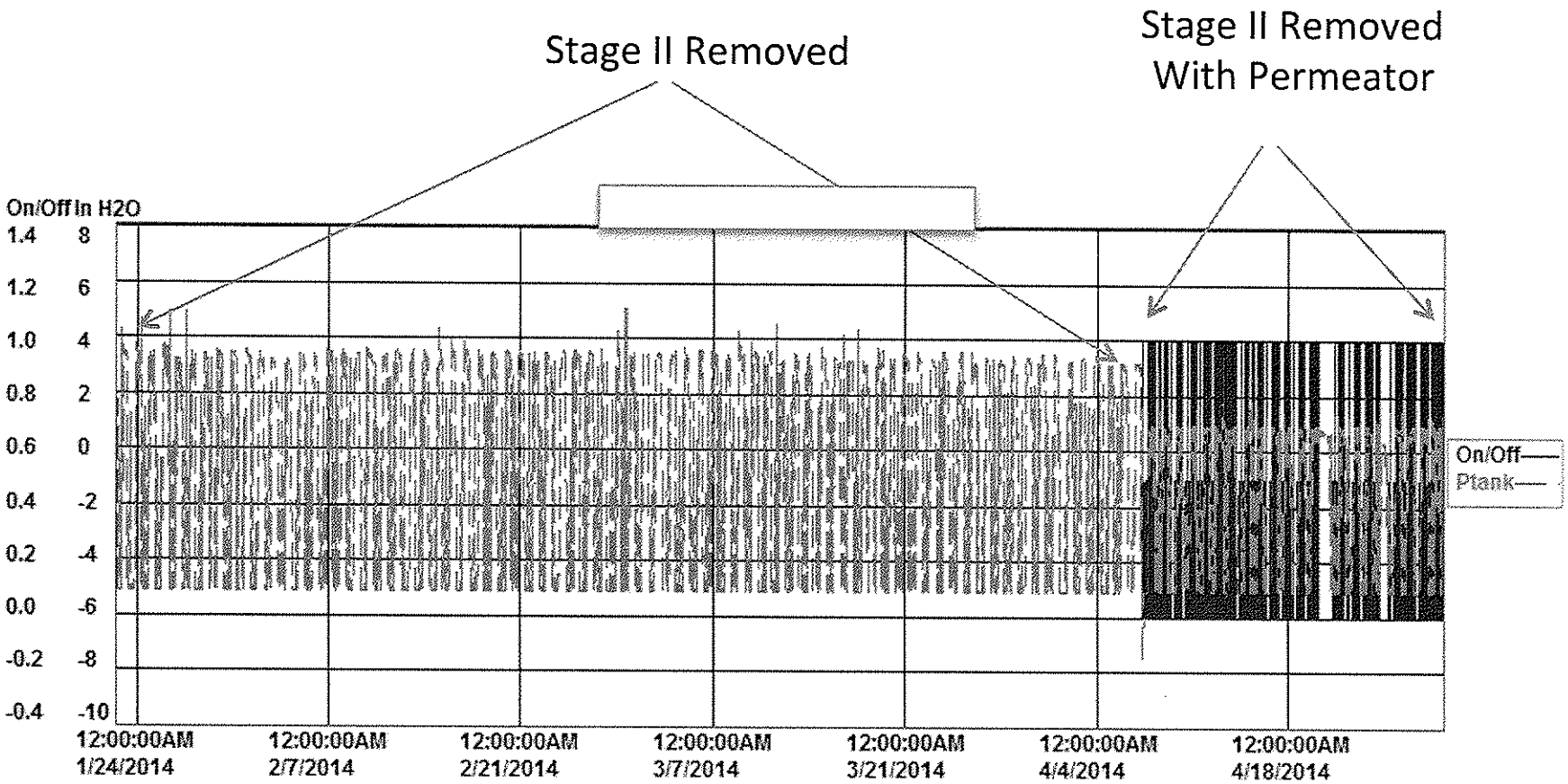


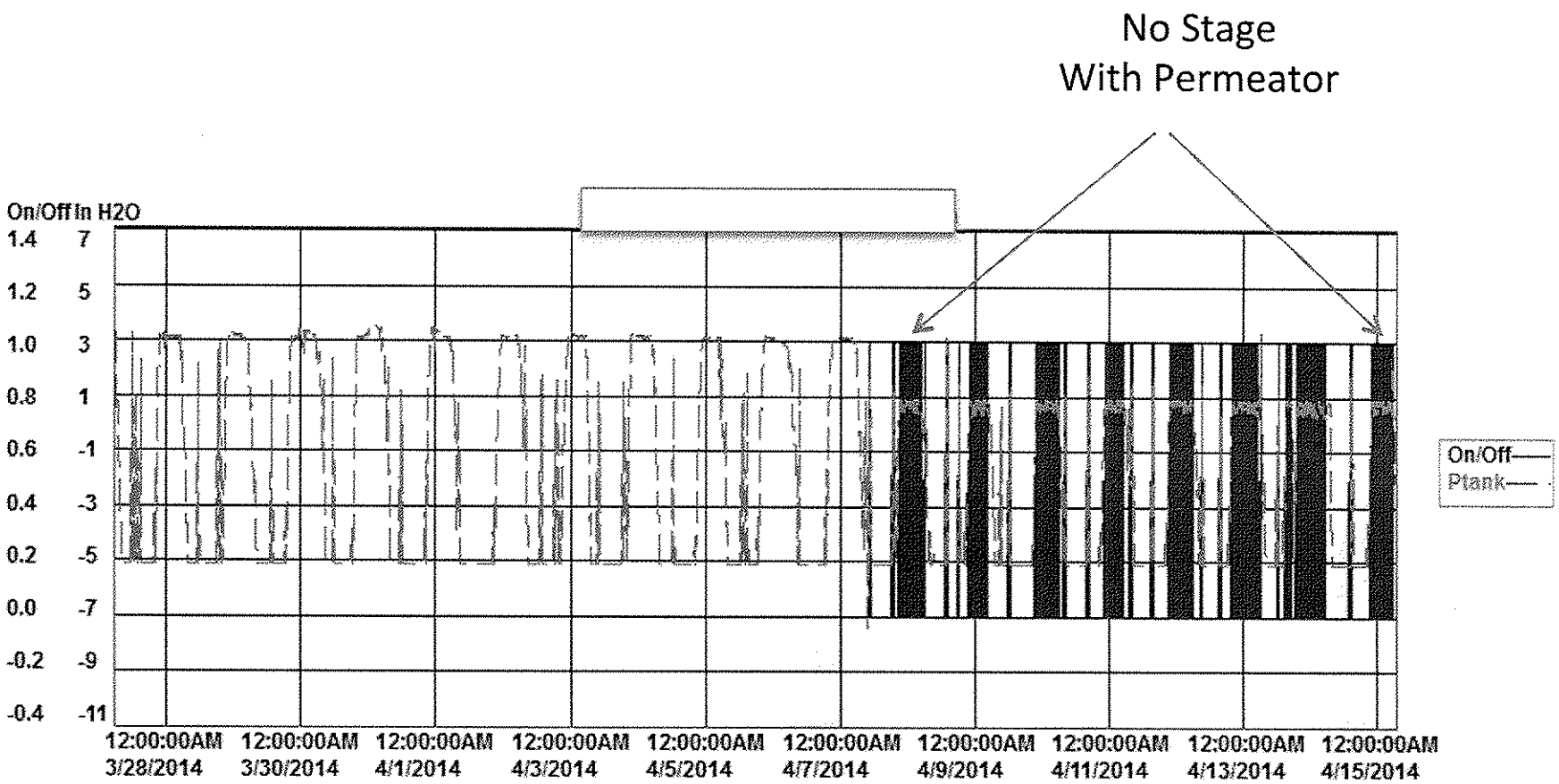
COS182C.TRW

Start Time: Aug/28/2013 12:32:13 AM
End Time: Aug/28/2013 10:58:13 AM

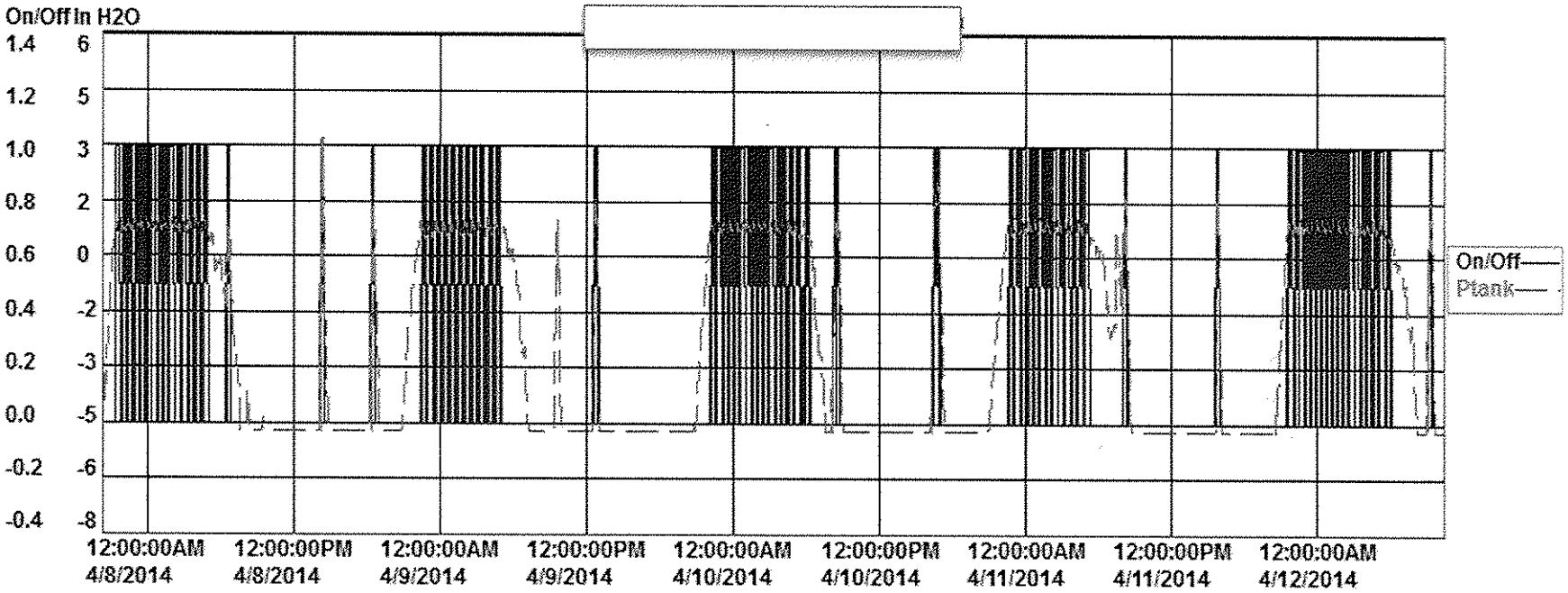
	Description	Rate	Readings	Low	Mean	High	Range	Units	
File:	[illegible]	120	314 Pts						
0	On/Off			0.00	0.51	1.00	1.00	Off	On
7	Ptank			0.264	0.550	0.936	0.672	In H2O	







No Stage with Permeator
Avg Run Time = 24%

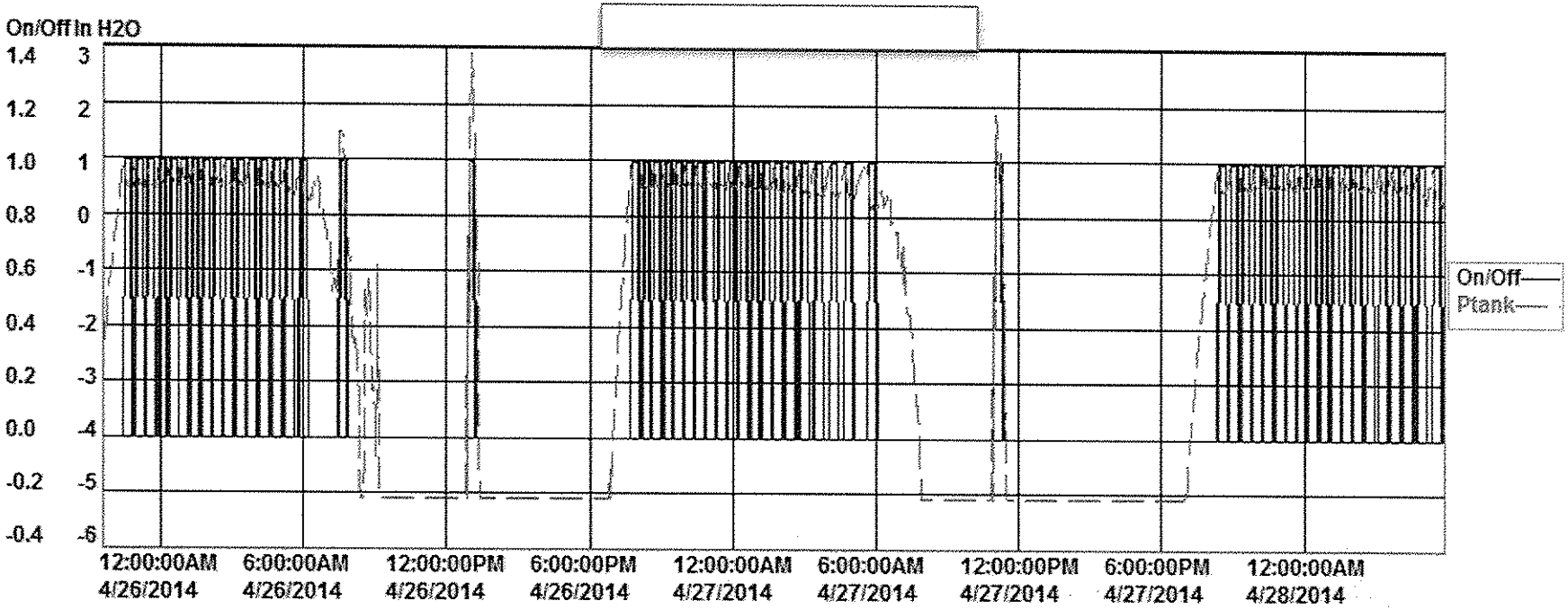


COS182C.TRW

Start Time: Apr/7/2014 8:23:09 PM
End Time: Apr/12/2014 10:35:09 AM

	Description	Rate	Readings	Low	Mean	High	Range	Units	
File	[illegible]	120	3307 Pts						
0	On/Off			0.00	0.24	1.00	1.00	Off	On
7	Ptank			-5.08	-2.33	3.15	8.23	In H2O	

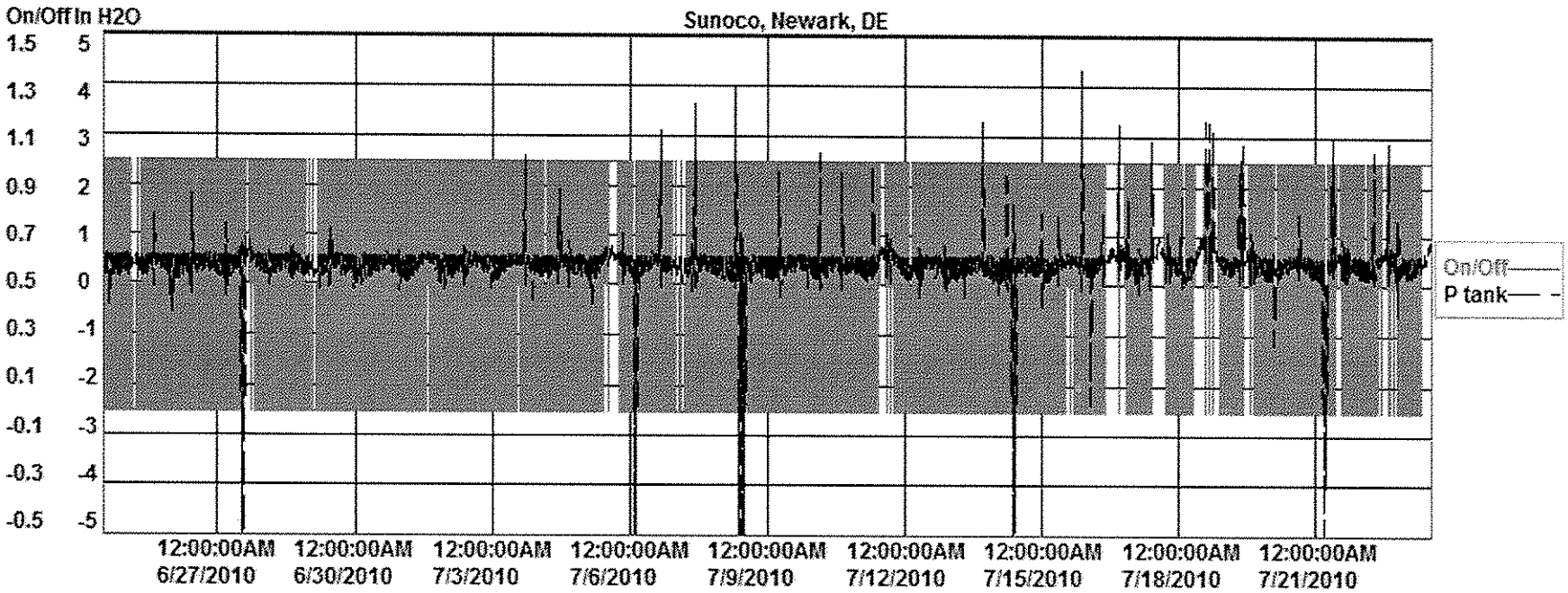
No Stage II with Permeator
Avg Run Time = 34%



COS182C.TRW

Start Time: Apr/25/2014 9:39:56 PM
End Time: Apr/28/2014 5:55:56 AM

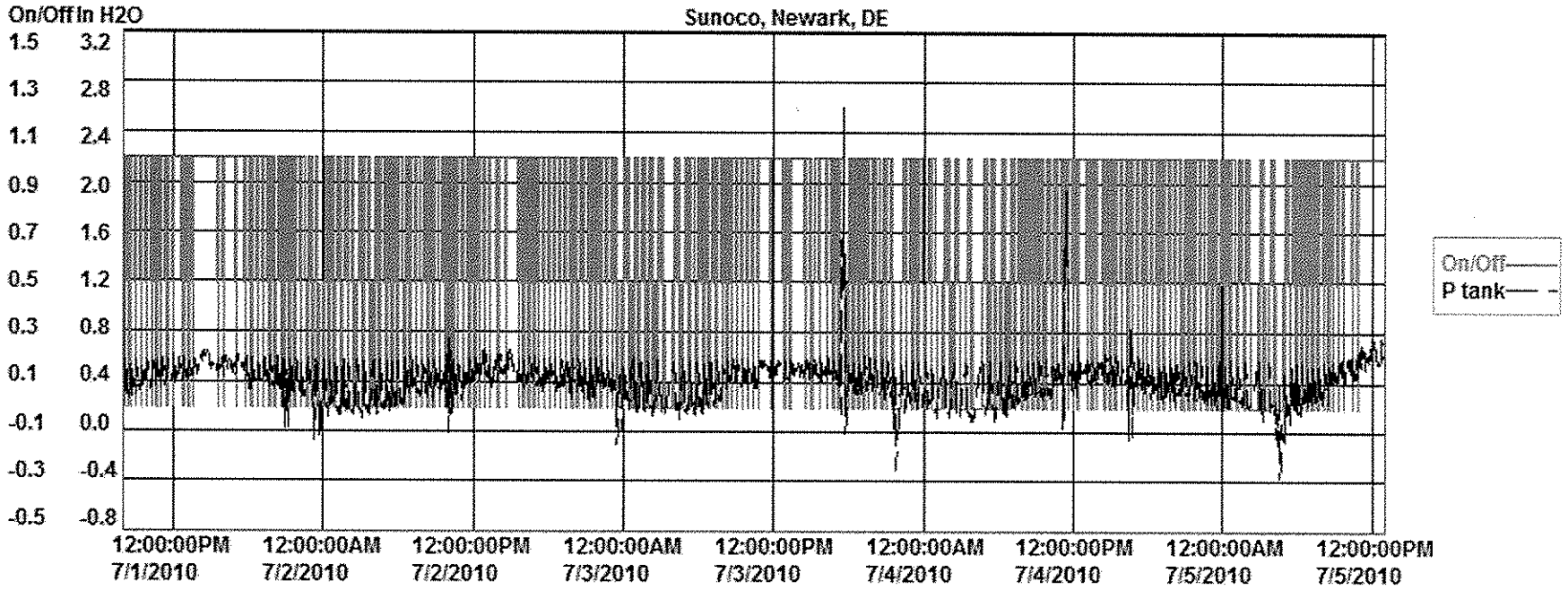
	Description	Rate	Readings	Low	Mean	High	Range	Units	
File:	COS182C.TRW	120	1689 Pts						
0	On/Off			0.00	0.34	1.00	1.00	Off	On
7	Ptank			-5.08	-1.65	2.90	7.98	In H2O	



SUNDEL6.TRW

Start Time: Jun/24/2010 12:53:29 PM
End Time: Jul/23/2010 1:31:29 PM

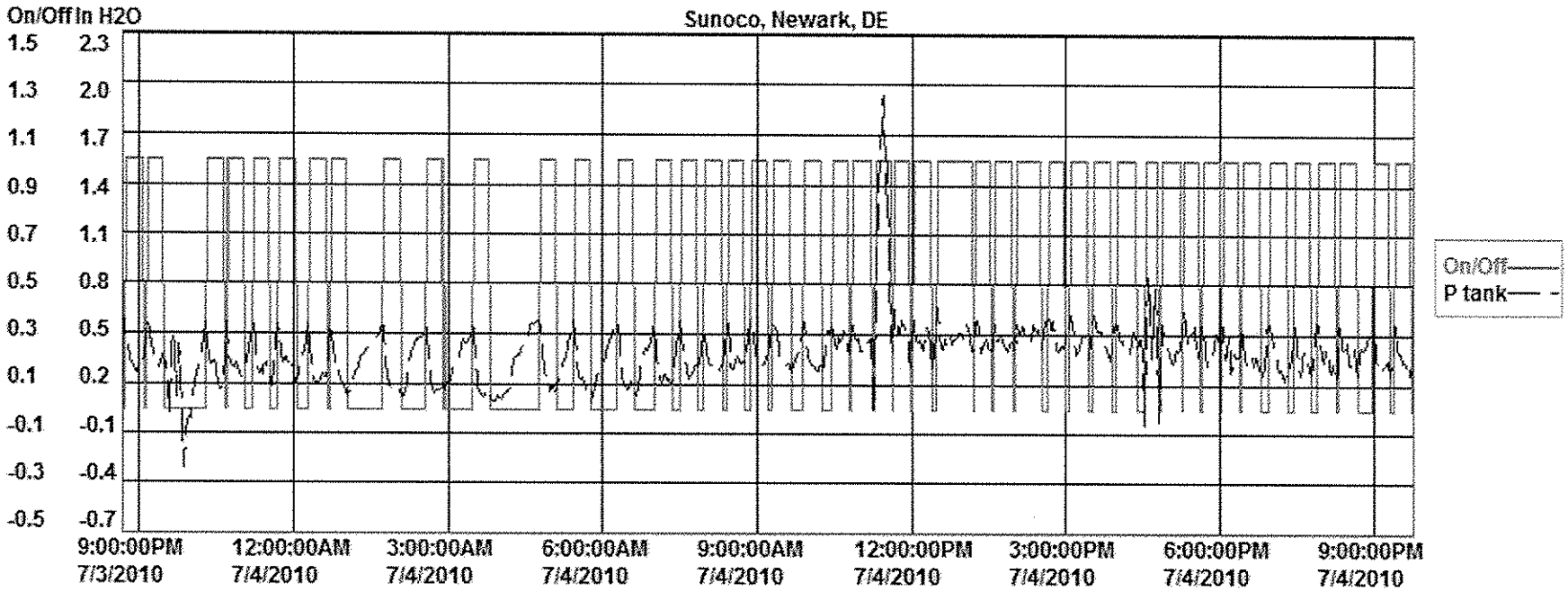
	Description	Rate	Readings	Low	Mean	High	Range	Units	
File:	SUNDEL6.TRW	120	20900 Pts						
0	On/Off			0.00	0.65	1.00	1.00	Off	On
7	P tank			-7.48	0.41	4.36	11.84	In H2O	



SUNDEL6.TRW

Start Time: Jul/1/2010 8:07:14 AM
End Time: Jul/5/2010 1:03:14 PM

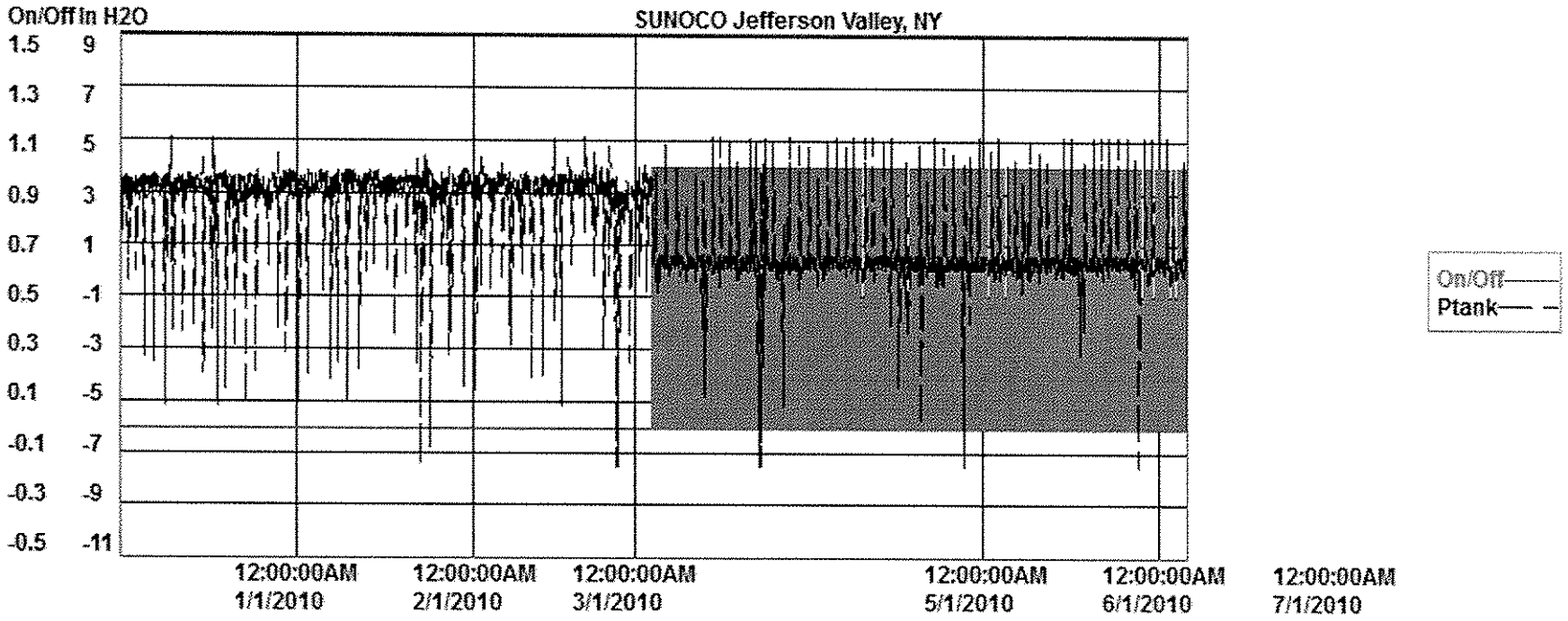
	Description	Rate	Readings	Low	Mean	High	Range	Units	
File:	SUNDEL6.TRW	120	3029 Pts						
0	On/Off			0.00	0.70	1.00	1.00	Off	On
7	P tank			-0.356	0.406	2.604	2.960	In H2O	

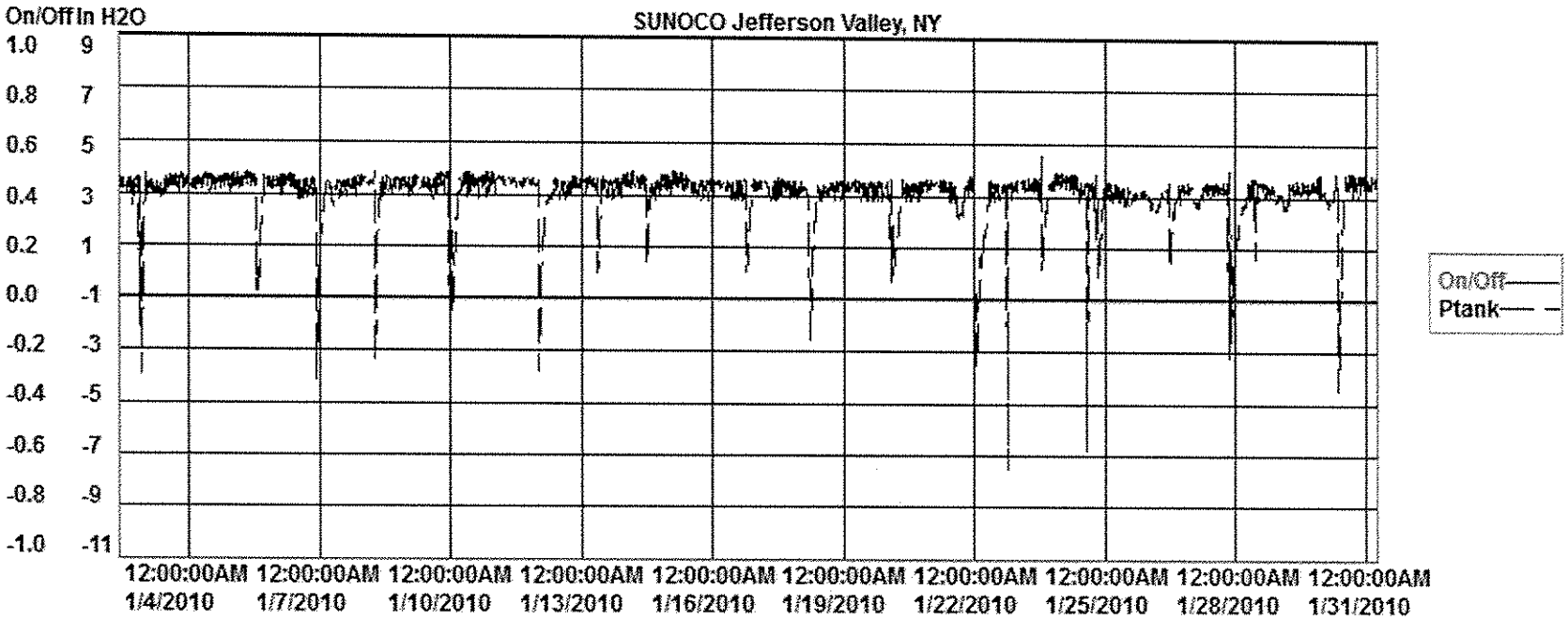


SUNDEL6.TRW

Start Time: Jul/3/2010 8:42:45 PM
End Time: Jul/4/2010 9:46:45 PM

	Description	Rate	Readings	Low	Mean	High	Range	Units	
File:	[illegible]	120	753 Pts						
0	On/Off			0.00	0.63	1.00	1.00	Off	On
7	P tank			-0.303	0.391	1.941	2.245	In H2O	

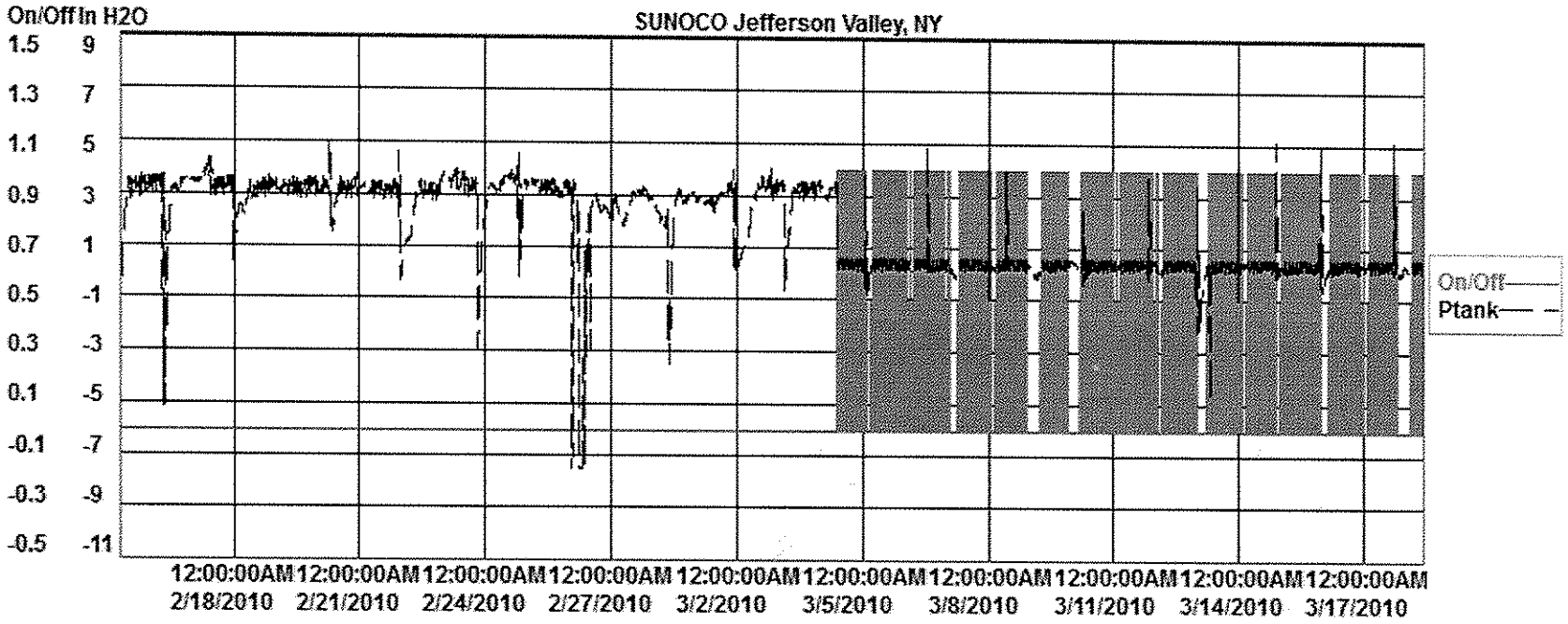

On/Off in H2O
SUNOCO Jefferson Valley, NY
1.5
1.3
1.1
0.9
0.7
0.5
0.3
0.1
-0.1
-0.3
-0.5
9
7
5
3
1
-1
-3
-5
-7
-9
-11
12:00:00AM 1/1/2010
12:00:00AM 2/1/2010
12:00:00AM 3/1/2010
12:00:00AM 5/1/2010
12:00:00AM 6/1/2010
12:00:00AM 7/1/2010
On/Off
Ptank

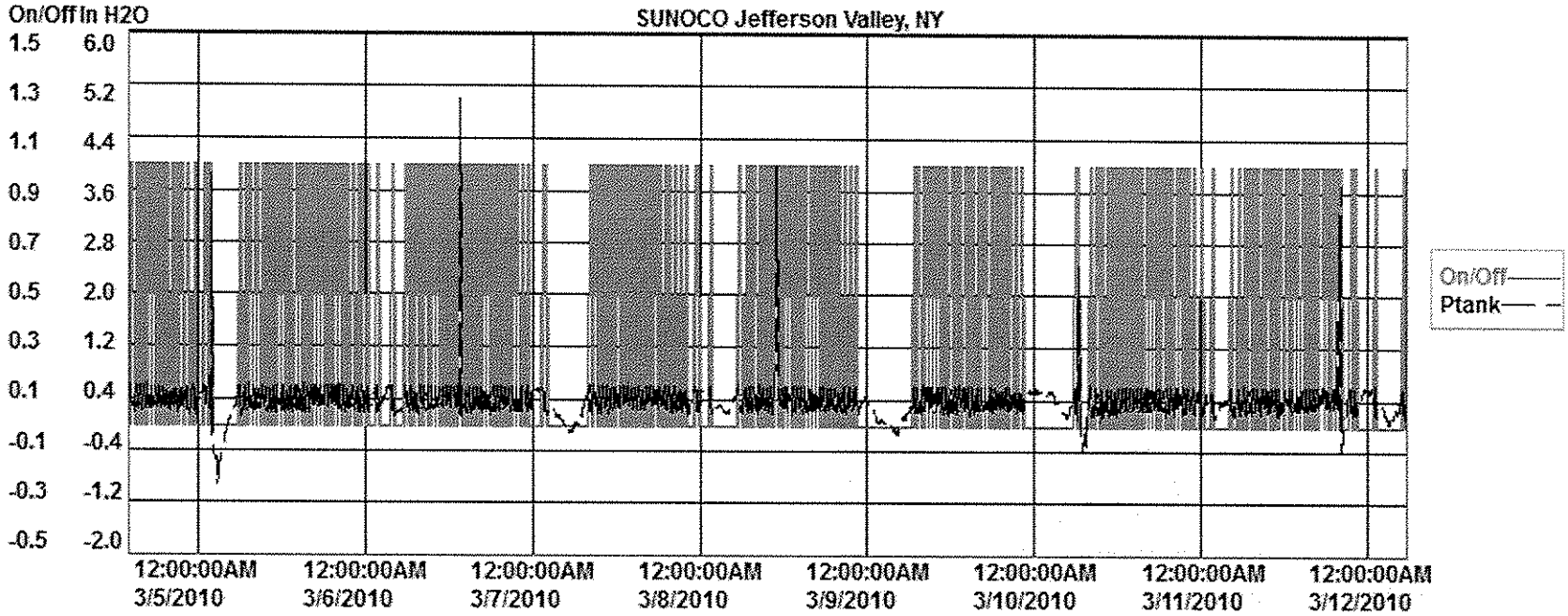


SUNJV4.TRW

Start Time: Jan/2/2010 10:35:09 AM
End Time: Jan/31/2010 6:27:09 AM

	Description	Rate	Readings	Low	Mean	High	Range	Units	
File:	SUNJV4.TRW	120	20757 Pts						
0	On/Off			0.00	0.00	0.00	0.00	Off	On
7	Ptank			-7.48	3.12	4.63	12.11	In H2O	

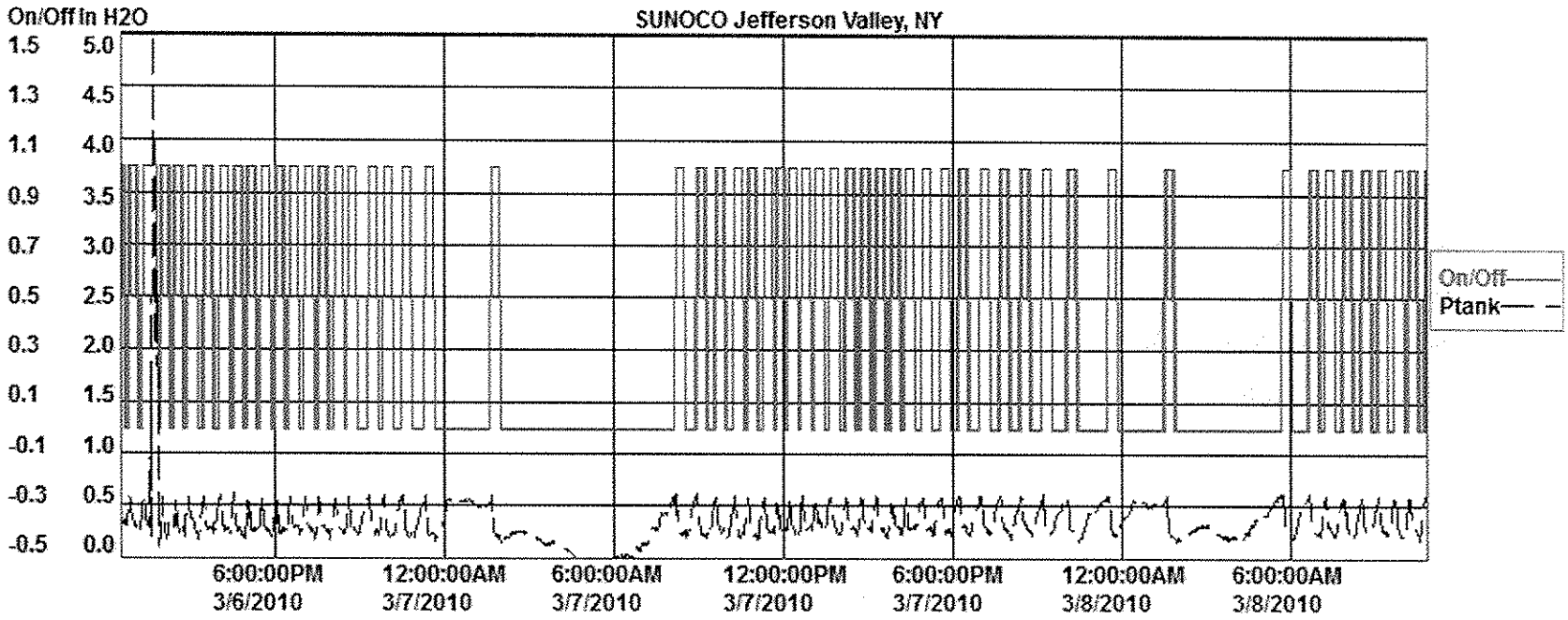

On/Off In H2O
SUNOCO Jefferson Valley, NY
1.5
1.3
1.1
0.9
0.7
0.5
0.3
0.1
-0.1
-0.3
-0.5
9
7
5
3
1
-1
-3
-5
-7
-9
-11
On/Off
Ptank
12:00:00AM 2/18/2010
12:00:00AM 2/21/2010
12:00:00AM 2/24/2010
12:00:00AM 2/27/2010
12:00:00AM 3/2/2010
12:00:00AM 3/5/2010
12:00:00AM 3/8/2010
12:00:00AM 3/11/2010
12:00:00AM 3/14/2010
12:00:00AM 3/17/2010

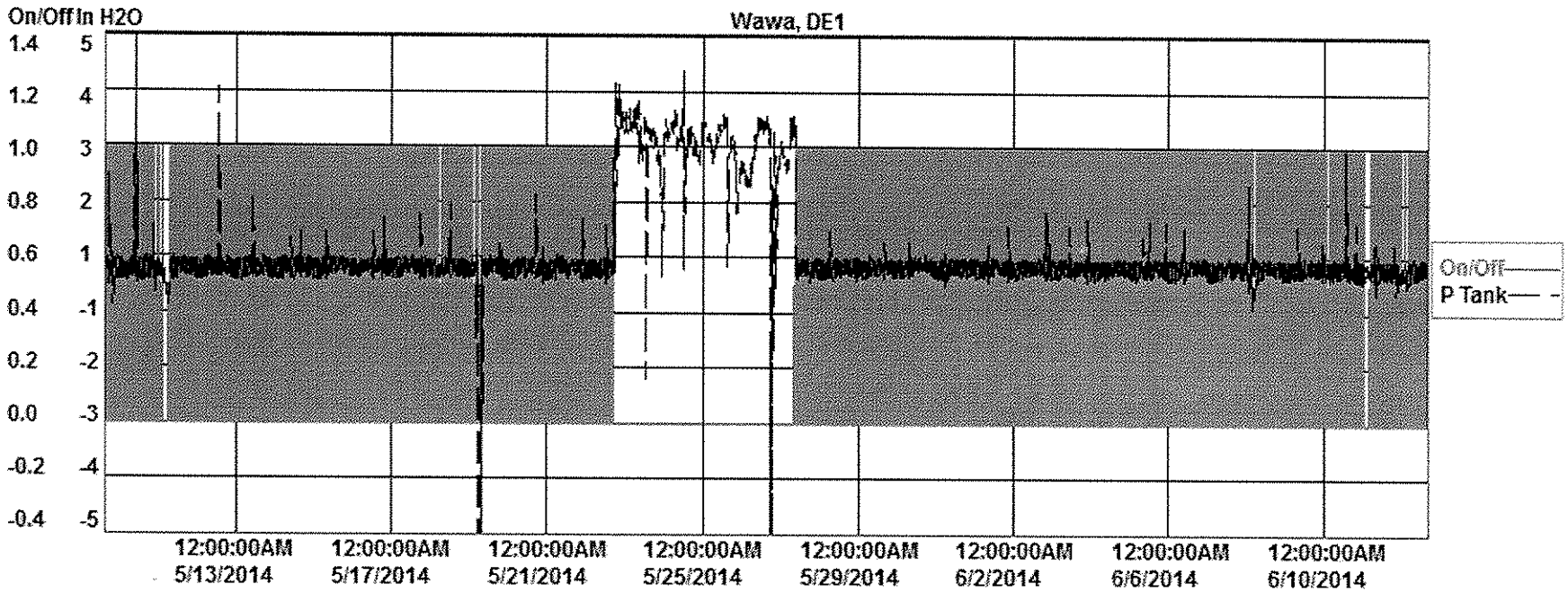


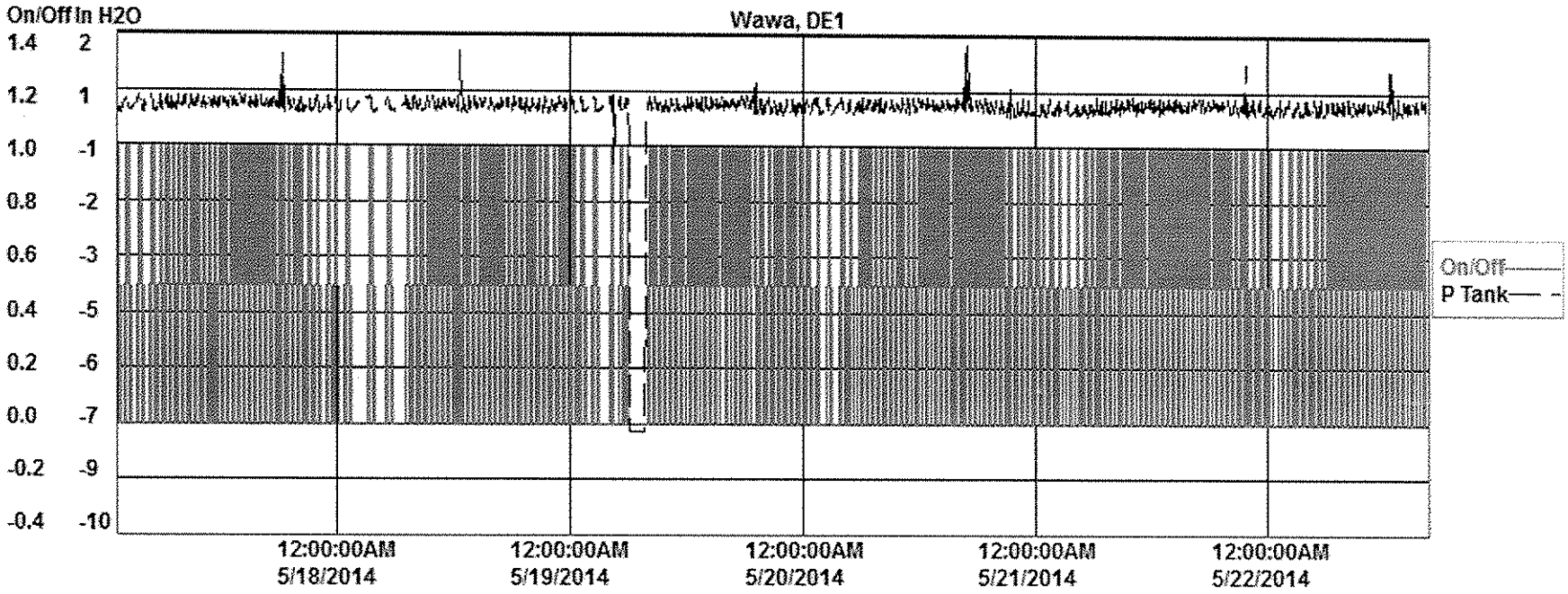
SUNJV4.TRW

Start Time: Mar/4/2010 2:12:50 PM
End Time: Mar/12/2010 5:46:50 AM

	Description	Rate	Readings	Low	Mean	High	Range	Units	
File:	SUNJV4.TRW	120	5508 Pts						
0	On/Off			0.00	0.41	1.00	1.00	Off	On
7	Ptank			-0.946	0.350	5.029	5.975	In H2O	



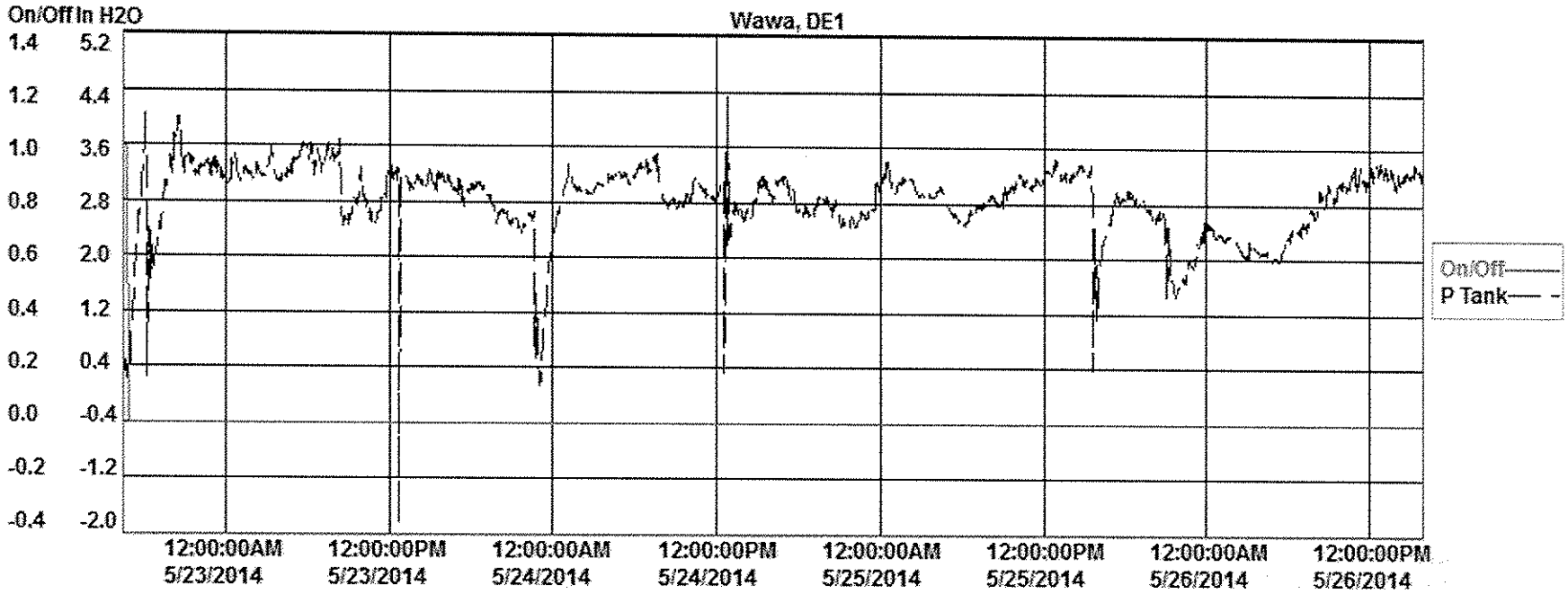




WAWA-DE1.TRW

Start Time: May/17/2014 1:24:09 AM
End Time: May/22/2014 4:48:09 PM

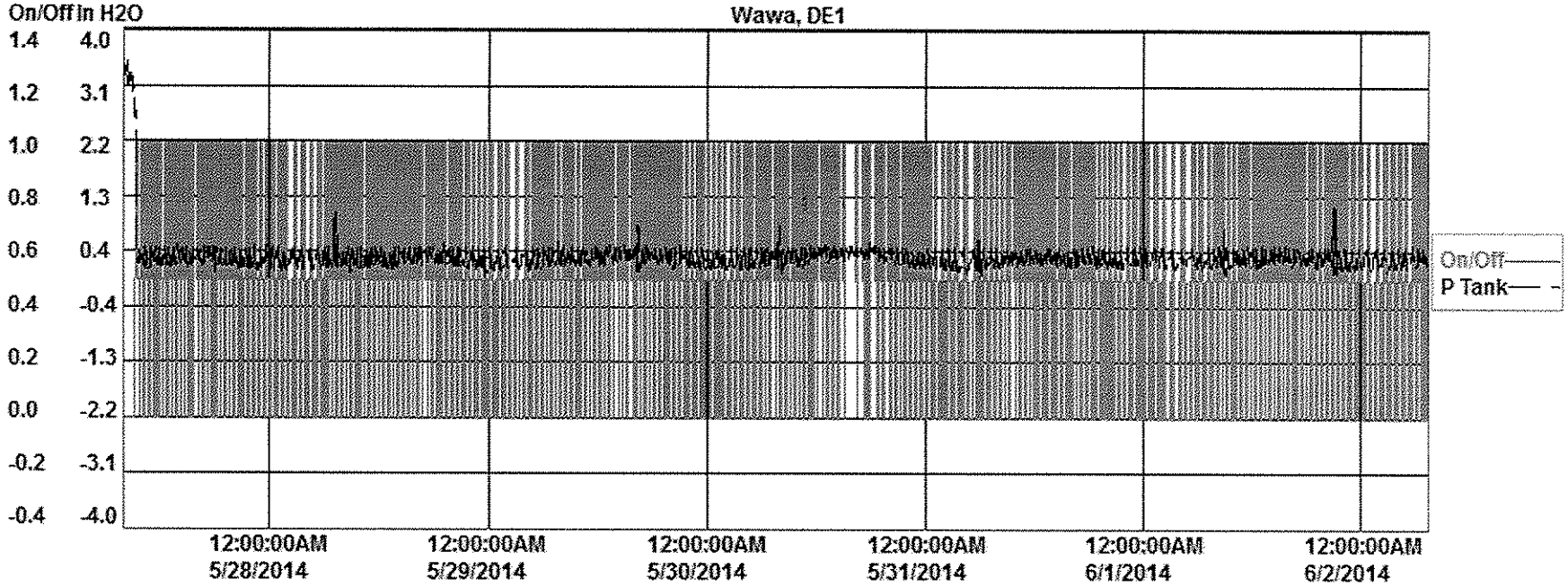
	Description	Rate	Readings	Low	Mean	High	Range	Units	
File:	[illegible]	120	4063 Pts						
0	On/Off			0.00	0.50	1.00	1.00	Off	On
7	P Tank			-7.48	0.22	1.81	9.30	In H2O	



WAWA-DE1.TRW

Start Time: May/22/2014 4:37:50 PM
End Time: May/26/2014 3:55:50 PM

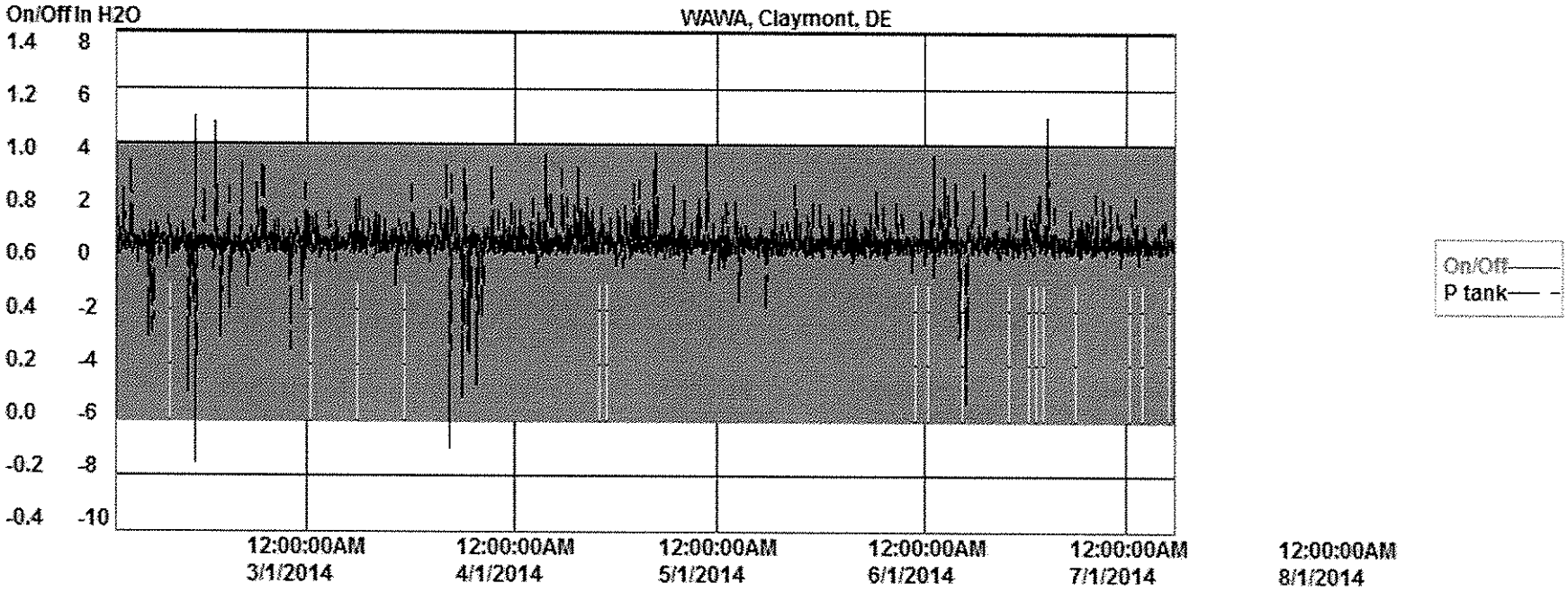
	Description	Rate	Readings	Low	Mean	High	Range	Units	
File:	WAWA-DE1.TRW	120	2860 Pts						
0	On/Off			0.00	0.00	1.00	1.00	Off	On
7	P Tank			-1.84	2.85	4.34	6.18	In H2O	



WAWA-DE1.TRW

Start Time: May/27/2014 8:03:52 AM
End Time: Jun/2/2014 7:31:52 AM

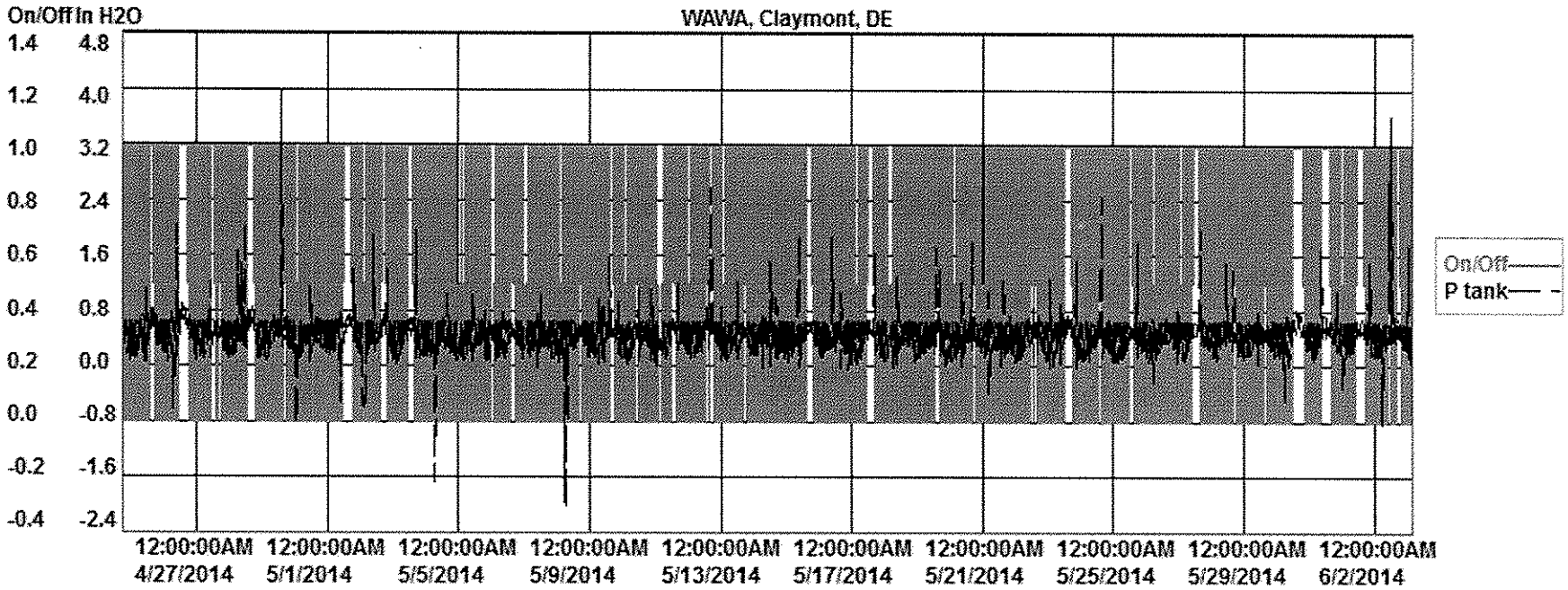
	Description	Rate	Readings	Low	Mean	High	Range	Units	
File:	[illegible]	120	4305 Pts						
0	On/Off			0.00	0.57	1.00	1.00	Off	On
7	P Tank			0.0131	0.3657	3.5221	3.5090	In H2O	



WAW-DE2.TRW

Start Time: Jan/31/2014 6:10:25 PM
End Time: Jul/8/2014 6:48:25 AM

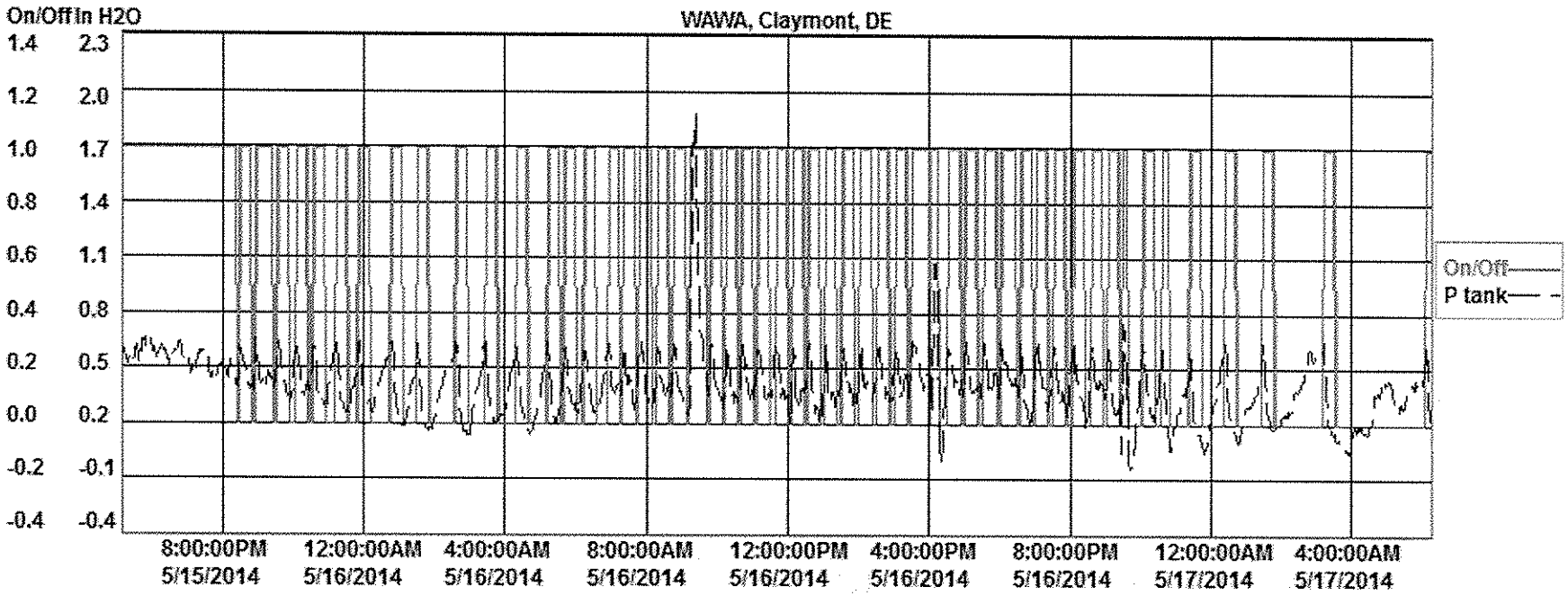
	Description	Rate	Readings	Low	Mean	High	Range	Units	
File	[illegible]	120	113420 Pts						
0	On/Off			0.00	0.70	1.00	1.00	Off	On
7	P tank			-7.48	0.46	5.05	12.54	In H2O	



WAW-DE2.TRW

Start Time: Apr/24/2014 7:08:19 PM
End Time: Jun/3/2014 4:10:19 AM

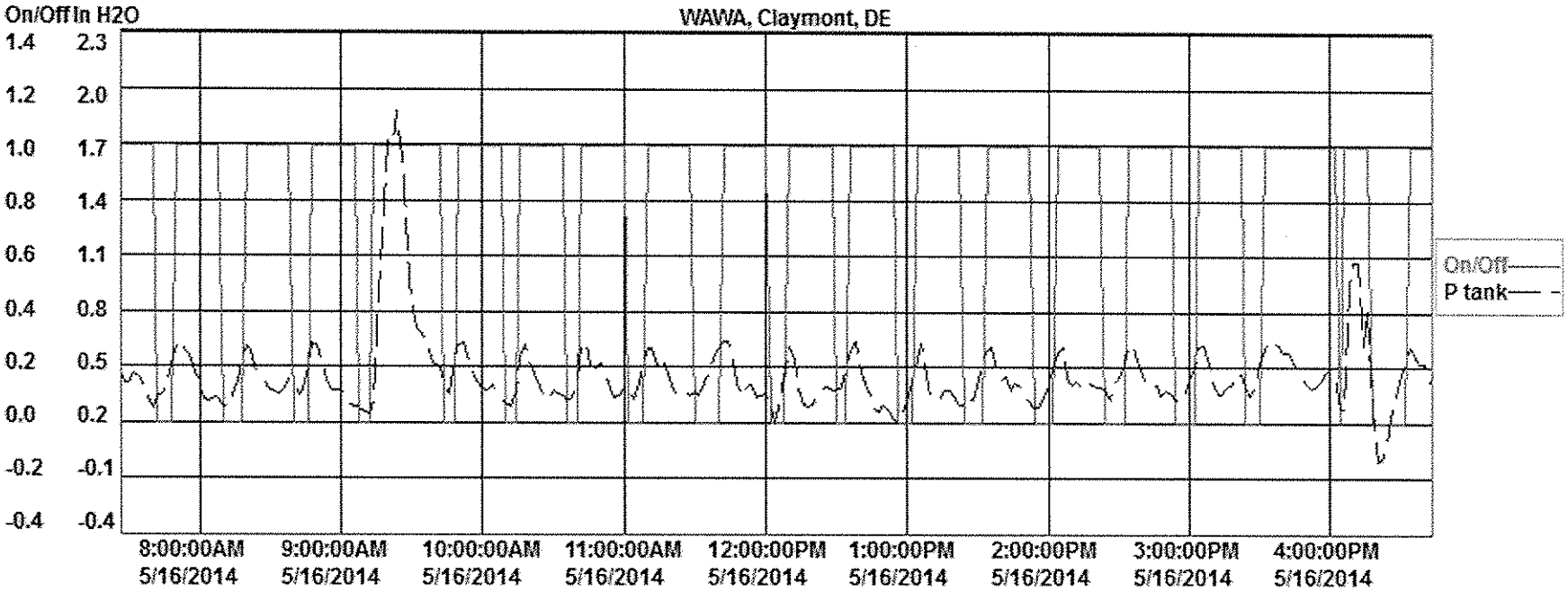
	Description	Rate	Readings	Low	Mean	High	Range	Units	
File:	[illegible]	120	28352 Pts						
0	On/Off			0.00	0.65	1.00	1.00	Off	On
7	P tank			-2.05	0.44	4.01	6.06	In H2O	



WAW-DE2.TRW

Start Time: May/15/2014 5:11:36 PM
End Time: May/17/2014 6:17:36 AM

	Description	Rate	Readings	Low	Mean	High	Range	Units	
File	WAW-DE2.TRW	120	1114 Pts						
0	On/Off			0.00	0.57	1.00	1.00	Off	On
7	P tank			-0.0273	0.4140	1.8823	1.9096	In H2O	



Blank page

B7 (2 pgs)

Gao, Frank F. (DNREC)

From: Alan Muller--Green Delaware <greendel@dca.net>
Sent: Monday, October 06, 2014 3:47 PM
To: Haynes, Robert P (DNREC)
Cc: Mirzakhalili, Ali (DNREC); Gao, Frank F. (DNREC); Amirikian, Ronald A. (DNREC); Fees, David F. (DNREC); overland@
Subject: Comments IN RE Draft Amendments to Regulation 1124 Section 36.0 "Stage II Vapor Recovery"

Mr. Robert Haynes, Hearing Officer
Delaware DNREC
Green Delaware's Comments IN RE Draft Amendments to Regulation 1124 Section 36.0 "Stage II Vapor Recovery"

Dear Mr. Haynes:

Green Delaware recently began a review of the record in this matter. (We had not been invited to participate in the "review committee" and were not contacted by other "environmental" participants.) We appreciate the extension of the public comment period as we requested and hope you find our comments useful.

A considerable amount of technical documentation has been generated by the Department and in general we feel the work is competently done and does not need repetition here. This is in addition to an extensive existing literature of EPA reports, industry publications, etc.

Handling gasoline exposes people to various toxins such as benzene--a known cause of cancer in humans. Therefore, minimizing these exposures, and resulting health impacts, should be considered a priority in addition to the concern of VOC contributions to ozone formation. The gas station people, at least in their public hearing testimony, did not address health impacts to their employees and customers.

The Division of Air Quality is proposing to do more to control gasoline vapor emissions than the minimum federal (USEPA) requirement, but less than the State of California, the leader in this area, is doing. Green Delaware feels that the DNREC proposal is sound and well-justified as far as it goes. But it does no go far enough.

The DNREC is proposing to allow the shutdown of Stage II vapor control at Delaware's approximately 330 gas stations. This means that Delaware would rely on the On-board Refueling Vapor Recovery (ORVR) systems that most--but by no means all--cars and light trucks are now equipped with. This also means that off road equipment, motorcycles, boats, "gas cans" for lawn care equipment, generators, etc, would lose the vapor control now provided by gas station nozzles.

There exists an "incompatibility" between some forms of "Stage II" gas station vapor recovery equipment and the "on board" (ORVR) systems that can potentially cause increased emissions from the gas station systems. This incompatibility can be cured by modifications to the Stage II systems.

California long ago decided to keep Stage II systems in service and cure the "incompatibilities." This approach provides the best control of gasoline vapors, and thus the maximum protection of air quality and public health. The equipment to do this is commercially available and demonstrated.

DNREC has shown that the present Stage II systems need more frequent inspection and maintenance. ("... a survey conducted during the development of the proposed regulatory revision indicated a majority of gas stations needed maintenance in order to pass the annual tank tightness test.") Apparently, 70 percent of gas station systems initially fail to pass their annual leak tests. These leaking systems likely cause some occupational exposures, and customer exposures, as well as increased gasoline vapor emissions. So, the DNREC proposal for a continuous pressure monitor (CPM) requirement makes sense whether Stage II is retained or only a pressure monitoring system is required.

The comments and testimony of the gas station interests provided no real response to these concerns. Their objections seem to have little if any factual basis.

The EPA and other sources claim a very high degree of reliability and effectiveness for the on-board (ORVR) systems. Based on personal observation, we have some doubts as to the effectiveness of the nozzle/filler neck seal on many ORVR systems. (Without positive pressure in the tank, from an effective seal, the displaced vapor will not enter the on-board canister.) In our experience, visible vapor and gasoline odors are common at stations without Stage II controls. Further, it seems surprising that on board systems would have a very high degree of reliability when gas station systems have a 70 percent annual (de facto) failure rate. This causes us to suspect that the "break even point," the point at which vacuum-assist Stage II systems are argued to increase, not decrease overall emissions, is probably farther in the future than the 2018-2019 time frame identified by the Division of Air Quality, if it exists at all. This further suggests that shutdown of Stage II systems in Delaware would be premature. Certainly shutdown of existing systems should not occur before the break even point.

The gas station people argue that the pressure in their tanks is likely to remain negative due to the dispensing of liquid from the pumps and the non-return of vapor. This may be, or might be if liquid withdrawal was constant, but if the systems are not vapor tight one may expect ingress of air and resulting vapor expansion. And their systems apparently do not reliably remain vapor tight. So, again, the continuous pressure monitoring is needed.

Therefore, sound public policy is to retain and modify Stage II vapor recovery, as necessary, to make it compatible with ORVR. An inferior alternative, the one now proposed by the Department, would allow the shutdown of Stage II vapor recovery but enact a continuous pressure monitoring requirement. The least desirable alternative would be the one apparently desired by the industry: Simple shutdown of State II.

Delaware usually tries to do a little better in air quality management than the minimum of federal requirements and the desirability of doing so in this case seems well-established. We urge the DNREC to "do the right thing."

Respectfully submitted,

Alan Muller

Alan Muller, Executive Director
Green Delaware
Box 69
Port Penn, DE 19731 USA
302.834.3466
cell 302.299.6783
greendel@dca.net
www.greendel.org

B8 (2 pgs)

10/6/2014 -- GPM Investments, LLC

Comments on proposed regulation change 1124-36.0 Control of Volatile Organic Compound Emissions – Vapor Emission Control at Gasoline Dispensing Facilities.

General Comments:

Based upon our review of the proposed regulation change, we do support elective decommissioning of the Stage II vapor recovery systems. As previously stated these systems have become redundant as updates to motor vehicle's onboard vapor recovery systems are now adequately capturing vapors during fueling events. Additionally, we understand the rationale for monitoring tank pressure once the Stage II systems are decommissioned. This can be achieved through annual testing instead of the costly ramifications for ***continuous monitoring***.

At a minimum, any technology requirement proposed for inclusion as part of regulation has to be fully vetted and tested while considering the potential ramifications to the economy of the State of Delaware. Proposed technologies and associated corrective actions need to be carefully weighed to ensure that enforcement of these regulations does not result in undue economic impact to facilities operating in the state. As written, it appears that these proposed regulations will, in fact, discourage future development and growth in the State of Delaware through the proposed implementation of unproven technologies.

Below we have included several comments relating to specific sections within the proposed regulation document. Please note that while we have only provided comment on select sections this does not indicate our concurrence with the proposed regulations in other sections of the proposed regulation. Rather, we have chosen to present broader comments which have more global relevance to the proposed regulation change that, if incorporated, would change the nature of the proposed regulation such that comments on other sections would no longer be appropriate as those sections would be revised.

Specific Comments:

36.1.1.1 – Avoidance of the word "never" would be prudent in this case as the current phrasing could generate conditions where a single months throughput, current or historic, could change the regulatory status of a facility. Instead, better phrasing might be "Any gasoline dispensing facility, which maintains an annual average throughput of less than 10,000 gallons of gasoline per month, shall be...."

36.1.4.1 and 36.1.4.2

Both of these sections allude to the possibility that decommissioning of Stage II vapor recovery systems is optional through key phrases such as "may decommission" and "any facility that decommissions." This language should be strengthened to make it clear that decommissioning of Stage II systems at existing facilities is optional and that if Stage II recovery is left in place then the revised tank monitoring requirements, present as part of this revision, will not apply. Conversely, there should also be a note

that any facility owner that elects to keep Stage II vapor recovery systems in place will be required to maintain compliance and testing of the UST systems per the previous regulation and section 36.3.

36.5

Continuous pressure monitoring systems are not proven technology and can result in numerous issues associated with UST system performance including false alarms and temperature related malfunctions. Additionally, the type of pressure monitoring system proposed as part of this regulation has not been adequately vetted on systems without Stage II Vapor Recovery in place. The current regulations require assessment of the UST systems negative pressure operation during testing of the Stage II system, which is a periodic requirement. Instead of continuous pressure monitoring, which has numerous drawbacks, a better solution would be to include a periodic (Annual) requirement to check operating vacuum and a requirement to ensure a means by which the negative pressure in the tanks can be verified, such as a vacuum monitoring port. This would allow the department to require verification of negative pressure operation of the UST system in the absence of Stage II systems, while preventing the possible difficulties associated with the proposed continuous monitoring systems and "corrective actions."

The proposed corrective actions lend themselves to high investment of capital, particularly for facilities with lower throughput, but essentially for any system which alarms for two consecutive weeks. The timeframes for response when the system alarms are also too small, requiring potentially significant amount of subsurface work to correct alarm deficiencies at emergency response levels of cost and turnaround time. Given the unproven nature of the proposed monitoring technology, this level of capital investment to correct an unknown number and type of potential deficiencies is not justified.

In closing, we believe the direction Delaware takes concerning this regulation should reflect its geographical region and not the direction which mirrors the State of California. The addition of the Continuous Pressure Monitoring system if proven to work in this region would make sense only if the surrounding mid Atlantic states, also signed on. Without other states following this method, there will never be a measurable benefit obtained from this directive. Other states have imposed annual Pressure Decay and Pressure Valve testing after Stage II decommissioning. We would like to see the State of Delaware do the same.

B9 (2 pgs)

Dave Fees
Delaware Division of Air Quality
Blue Hen Corporation Center Suite 5N
655 South Bay Road, Dover, DE 19901

Subject: Stage II Revision

Date: October 2, 2014

Mr. Fees,

VST would like to respectfully submit for your review our comments to the latest revision of the proposed revision to Section 36 "Stage II Vapor Recovery" of 7 DE Admin Code 1124 "Control of Volatile Organic Compound Emissions". While VST understands the increase in ORVR penetration in the state of Delaware diminishes the need for Stage II Vapor Recovery equipment, the need to address the emissions from the population of vehicles that do not have ORVR is still required and the emissions from over-pressurization of stations that shut down overnight must be addressed. With that said, please accept our comments below.

1. As referenced in the proposed revisions, the CPM systems that would be used in Delaware are not the same configuration as the certified systems called out in Executive Order VR-202-P; therefore, these systems have not been certified by CARB. In addition, these CPM systems have not been tested on Stage 1 only systems; which are the configuration that would be installed in Delaware. The referenced CARB Executive Order contains In Station Diagnostic (ISD) systems, not CPMs. The differences are significant. Not only are all vapor path monitoring systems removed but lack of testing in the new configuration precludes knowledge of true CPM system performance. CPM manufacturers will need to provide Installation, Operation and Maintenance manuals specific to CPMs not ISD systems. Such a manual will not have been reviewed by CARB. Thus, as currently written, the revision does not correctly identify the CPM system to be used (as it calls out systems in VR-202-P), nor have these systems been tested in the form to which they will be utilized in Delaware.

2. The current revision as written limits the number of possible CPM system suppliers to the two named in the Executive Order (EO). VST understands the desire to use "proven CARB technology"; however, in the form being requested by Delaware, no systems have been tested or proven by CARB. Therefore, Delaware needs to develop a set of testing criteria, or allow Third Party Testing, to test all systems under the configuration requested by Delaware and allow all manufacturers to apply to be considered.

VAPOR SYSTEMS TECHNOLOGIES, INC.
650 Pleasant Valley Drive · Springboro, OH 45066
Tel 937-704-9333 · Fax 937-704-9443
www.vsthose.com

3. With no annual testing, the CPM system could be misreporting emissions or emissions could be ignored for up to 3 years before a required test would find an issue. An annual, independent, verification of CPM performance should be considered to verify data reported by CPMs.

4. CPMs simply monitor emissions they do not reduce emissions; therefore, if emissions are detected in two consecutive weeks, the owner/operator will have to install additional equipment for pressure management. Direct, intermittent measuring techniques are readily available which can also determine GDF leak integrity at costs lower than CPM. For smaller stations that shut down overnight which have shown to pressurize beyond the PV cracking pressure, Delaware should consider allowing CARB certified PM systems, as found in VR-202 and VR-204, to be installed in place of CPMs at the discretion of the GDF owner. At a cost of $16,000- $20,000 depending on the location of the install, PM systems that monitor and control would be more cost effective.

5. CARB ISD systems are only applicable to GDFs with through-puts greater than 50,000 gallons per month; a similar cut-off should be considered for Delaware CPM systems. CARB exempts GDFs smaller than 50,000 gallons per month through-put for various reasons. The result is no GDF in California smaller than this has ever been tested by CARB for ISD applicability. If CPMs are based on ISD systems, there is no data to support applicability of CPMs to the 10,000 gallon per month level. It is suggested GDFs between 10,000 and 50,000 gallons monthly through-put be allowed the alternative of using the emission reducing strategy of ECO nozzles and low perm hoses. This would also help bridge the gap of the vehicles without ORVR.

Thank you for your consideration of our comments. If you have any questions on any of the above comments, please call Erin Faessler at 937-704-9333. Thank you.

Respectfully,

Erin L. Faessler

Erin Faessler
Development Projects Manager

VAPOR SYSTEMS TECHNOLOGIES, INC.
650 Pleasant Valley Drive · Springboro, OH 45066
Tel 937-704-9333 · Fax 937-704-9443
www.vsthose.com

B10 (4 pgs)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

OCT 0 6 2014

Mr. Ali Mirzakhalili, Director
Division of Air Quality
Delaware Department of Natural Resources & Environmental Control
655 South Bay Road, Suite 5N
Dover, Delaware 19901

Dear M. Mirzakhalili:

Thank you for the opportunity to comment on the proposed revision to Section 36 "Stage II Vapor Recovery" of 7 DE Admin Code 1124 "Control of Volatile Organic Compound Emissions." The Department of Air Quality's regulatory revision proposes to allow for the immediate discontinuation of Stage II vapor recovery requirements for new gasoline dispensing facilities, contingent upon meeting new requirements to minimize leaks and venting from their gasoline tanks. The proposal also would allow existing gas stations to decommission their Stage II systems immediately (upon the effective date of the rule) if they meet the same leak detection and minimization requirements as have been proposed for new stations.

As you are aware, the Environmental Protection Agency (EPA) published a final rule in May of 2012 finding that on-board vapor recovery is in widespread use nationwide and has exercised its related authority under section 202(a)(6) of the Clean Air Act (CAA) to waive requirements for Stage II vapor recovery (Stage II) at gasoline dispensing facilities in new ozone nonattainment areas classified as serious or above. EPA's action similarly granted any state currently implementing Stage II the option to adopt a State Implementation Plan (SIP) revision that once approved by EPA, could phase out the Stage II program. States have the option to retain Stage II or to remove their Stage II requirement rules from their SIP. States in the Ozone Transport Region (OTR) continue to have a statutory obligation to implement either Stage II or another measure achieving comparable emission reductions to Stage II, under section 184(b)(2) of the CAA. Regardless of these changes to federal Stage II program requirements, a state with a SIP-approved Stage II program may not decommission that program until EPA has approved the state's SIP demonstration.

EPA issued a guidance document titled, "Guidance on Removing Stage II Gasoline Vapor Control Programs from State Implementation Plans and Assessing Comparable Measure" (EPA-457/B12-001) on August 07, 2012 (Stage II Removal Guidance). States implementing Stage II may now legally phase out Stage II if doing so does not interfere with attaining or maintaining ozone National Ambient Air Quality Standards (NAAQS), per the "noninterference" provisions of section 110(l) of the CAA. The potential emission control losses from removing Stage II systems are transitional and relatively small, and as on board refueling vapor recovery (ORVR) vehicles increasingly penetrate the fleet over time, the benefits of Stage II will continue to

decline. EPA's guidance sets out several means to address phase-out of Stage II while preventing an increase in volatile organic compounds (VOC) emissions in the nonattainment area, including: substitution of new control measures for Stage II (in a contemporaneous manner), offset of emissions due to emission reductions not currently accounted for in the current SIP; or demonstrating that the near-term emission increases from decommissioning Stage II do not interfere with attainment for the nonattainment area.

Section 5 of EPA's Stage II Removal Guidance details requirements for submission, review, and approval of SIP revisions to remove existing, SIP-approved Stage II programs. When submitting a SIP revision, the SIP package should include the information necessary for EPA to determine that the action complies with all relevant CAA provisions, including sections 110(l), 184(b)(2) and, if applicable, section 193 (related to programs in existing prior to the 1990 CAA Amendments). Per the guidance, the submittal should "include analysis, discussion, and any other relevant materials supporting a request for SIP approval..." Also, if new emissions control regulations are being adopted to offset emissions controls foregone by the phase-out of a Stage II program, an analysis of the expected net area-wide emissions change would be appropriate.

EPA comments are provided in the enclosure to this letter. We look forward to working with you to address these comments. Please do not hesitate to contact me, or have your staff person contact Mr. Brian Rehn of my staff at (215) 814-2176 for any questions pertaining to these comments.

Sincerely,

David L. Arnold, Acting Director
Air Protection Division

Enclosure

cc: Mr. Ronald Amirikian, Division of Air Quality, DE DNREC

EPA's Comments on Delaware's Regulation Revisions to Vapor Emission Control Requirements at Gas Stations in Delaware

1. EPA recommends that the Delaware Department of Natural Resources & Environmental Control (DNREC) revises its technical analysis to more clearly explain how the overall loss of emissions benefits from decommissioning Stage II would impact the area, and the means by which Delaware would offset the resultant relative emissions increase, or alternatively demonstrate that the increase in short-term emissions from Stage II decommissioning would not interfere with the ability of the nonattainment area's ability to attain maintain the ozone National Ambient Air Quality Standards (NAAQS). One specific recommendation would be to combine the findings of the "Stage II Break-Even Calculation for Delaware" document with those of the "Emission Calculations and Cost/Benefit Analysis of the Regulation Revisions to Vapor Emission Control Requirements at Gas Stations in Delaware" in order to more clearly demonstrate the impacts of the program, the break even date, and how emission increases resulting from Stage II decommissioning could be offset in the short term, or otherwise shown to avoid interference with the NAAQS in the time period of decommissioning.

2. The non-interference analysis should clearly specify when Stage II will be decommissioned, and if necessary, provide an analysis of substitute control measures that will replace it in a contemporaneous manner, or otherwise demonstrate noninterference under section 110(l) and also satisfies the comparable measure demonstration requirement for OTR area programs governed by section 184(b)(2) of the CAA.

3. EPA's guidance states that where a Stage II program is part of an EPA-approved SIP, the state need to continue to implement Stage II until EPA approves a SIP revision to remove Stage II requirements from the SIP. Section 36.1.4.2 of Delaware's proposed rule states that an owner/operator of a gasoline dispensing facility may decommission its Stage II system "on or after the effective date of this revision." Further, section 36.1.4.1 states that any new facility commencing construction on or after the effective date of the revision shall comply with section 36.4 (pertaining to standards for facilities without vapor recovery systems). Delaware's analysis seems to show a Stage II "break-even" timeframe in the 2018-2019 period. Delaware's demonstration that removal of Stage II will meet all relevant CAA requirements under section 110(l) and 184(b)(2) of the CAA is not clearly established, particularly in the timeframe established under the proposed rule to begin decommissioning Stage II systems immediately upon the effective date of the regulation.

4. Delaware's Stage II SIP revision does not clearly specify the date by which Delaware concludes the incompatibility excess emissions (IEE) increases (caused by incompatibly between vacuum-assisted Stage II systems and vehicle ORVR systems) will outweigh the benefits from retaining the Stage II program. Delaware needs to evaluate this based on a "break even" analysis to determine the date by which Delaware will act to sunset requirements for the Stage II program. If Delaware intends to sunset Stage II prior to that point in time, the incremental benefits associated with retaining Stage II would need to be otherwise offset by other measures or shown to otherwise not interfere with the NAAQS.

5. Section 36.4 of Delaware's proposed Regulation 1124 introduces new continuous pressure monitoring requirements and requirements related to failures of monitoring, as well as periodic testing requirements for underground storage tanks. However, the proposed SIP revision does not contain a clear analysis demonstrating the benefits of this measure, or how or if this measure (in conjunction with or separate from other measures) will demonstrate compliance with CAA section 110(l) and 184(b) requirements.

6. Section 36.4.4 and 36.4.5 of Delaware's proposed Regulation 1124 (applicable to standards for gasoline dispensing facilities without Stage II systems) contain placeholders for future requirements for enhanced conventional nozzles and dispensing hoses, respectively. It is unclear if Delaware relies on these benefits to offset short-term increases in VOC emissions from decommissioning Stage II, or when these measures will be added as requirements to Delaware's Regulation 1124. Delaware analysis indicates only that DAQ has evaluated the shrinking benefit of Stage II and determined that alternative requirements would be more cost effective than retaining Stage II system.

7. Delaware's SIP revision, as proposed, seems to allow immediate decommissioning of Stage II (i.e., the 2015 timeframe) with a demonstration of a Stage II "break-even" date to occur between 2018 and 2019, without demonstrating that Delaware has instituted contemporaneous measures that will offset or otherwise demonstrate noninterference with the NAAQS. No estimate is provided for either the timeframe by which non-Stage II hose/nozzle enhancements will be in place (as placeholdered in the proposed rule), nor are the benefits for those measures demonstrated in the proposed package. Further, it is unclear if the continuous monitoring requirements for new gasoline facilities or facilities decommissioning Stage II can be demonstrated to alleviate the VOC benefits lost from decommissioning Stage II between the period covering immediate decommissioning and the 2018-2019 break-even timeframe when Stage II incremental benefits would be reduced to zero without additional offsetting measures.