

Public Utilities Commission of Ohio Service Monitoring and Enforcement Department 180 East Broad Street, 7th Floor Columbus, OH 43215

15-1351-GA-GPS

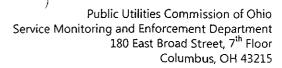
14

Natural Gas Pipeline Failure Investigation Report

Operator: Columbia Gas of Ohi	0	Operator ID: 2596			
Operator Address: 290 West Na	tionwide Blvd.				
Company Official Point of Conta	ct: Daniel Creekmur - Presid	lent			
Phone No: (614) 460-4680	± 9. , 1, 9. , 1, 1, 1	E-Mail: dcreekmur@nisource	e.com		
			· · · · · · · · · · · · · · · · · · ·		
Incident Criteria					
Deaths: 0 Names and A	ges N/A		71 L		
Injuries requiring hospitalization:	Names and Ages N/A		<u> </u>		
Est. Property Damage: \$9MM		hibatial and 20+ with structura	al damage C		
Estimated Gas Lost (MMCF) 16	63 mcf 1/2" op	ents: Gas was calculated based or ening at 7 psig, from the time cur as opened until it was closed.	1 O		
			•		
Failure Location and Respo	nse significant de la companya de l				
Address / Location: 3418 Sunni	ngdale Way				
City Ilman Aulinoton		County: Franklin			
City: Upper Ariington					
	Coordinates of Failure Location	n: Latitude: 40.027082	Longitude: -83.057943		
(Coordinates of Failure Location Time of Failure: 14:47	1: Latitude: 40.027082 Time Detected: COH On location	Longitude: -83.057943 Time Located: COH On location		
Date of Failure: 03/21/15 How Located: COH On locatio	Time of Failure: 14:47	Time Detected: COH On	Time Located: COH On		
Date of Failure: 03/21/15 How Located: COH On locatio NRC Report #: 1111378 -	Time of Failure: 14:47	Time Detected: COH On	Time Located: COH On		
Date of Failure: 03/21/15 How Located: COH On locatio NRC Report #: 1111378 - Appendix GG	Time of Failure: 14:47	Time Detected: COH On location	Time Located: COH On		
Date of Failure: 03/21/15 How Located: COH On location NRC Report #: 1111378 - Appendix GG	Time of Failure: 14:47 n Time Reported: 15:45	Time Detected: COH On location	Time Located: COH On		
Date of Failure: 03/21/15 How Located: COH On location NRC Report #: 1111378 - Appendix GG Type of Pipeline:	Time of Failure: 14:47 n Time Reported: 15:45 Gas T	Time Detected: COH On location Reported By: Rob Smith	Time Located: COH On location		
Date of Failure: 03/21/15 How Located: COH On location NRC Report #: 1111378 - Appendix GG Type of Pipeline: Gas Distribution	Time of Failure: 14:47 n Time Reported: 15:45 Gas T	Time Detected: COH On location Reported By: Rob Smith	Time Located: COH On location Gas Gathering / Other		
Date of Failure: 03/21/15 How Located: COH On locationon NRC Report #: 1111378 - Appendix GG Type of Pipeline: Gas Distribution Private distribution	Time of Failure: 14:47 n Time Reported: 15:45 Gas T	Time Detected: COH On location Reported By: Rob Smith ransmission Interstate	Time Located: COH On location Gas Gathering / Other Part 192 Gathering		

This is to certify that the images appearing are an accurate and complete reproduction of a case file document delivered in the regular course of business.

Date Processed // 2 4//6





System Description:	
2" coated steel main, cathodically protected. MAG	ain, cathodically protected. MAOP = 9.5 psig, operating pressure 7 psig. ic Steel. orfed Apparent Cause Company Reported Sub-Cause (from PHMSA Form 7100-1/7100-2) e Damage Damage de Force Damage
Services:	
Active - 1" Plastic	ent Cause Company Reported Sub-Cause (from PHMSA Form 7100-17/7100-2)
Old Idle - 1-1/4" Steel.	
	e - 1" Plastic lle - 1-1/4" Steel. pany Reported Apparent Cause Company Reported Sub-Cause (from PHMSA Form 7100-1/7100-2) orrosion atural Force Damage xcavation Damage
Company Reported Apparent Cause	Company Reported Sub-Cause (from PHMSA Form 7100-1-7.7100-2)
☐ Corrosion	
☐ Natural Force Damage	
☐ Excavation Damage	
Other Outside Force Damage	
Material Failure (Pipe, Joint, Weld)	
Equipment Failure	
☐ Incorrect Operation	
☐ Other	Miscapped/mislabeled/mislocated City Water Curb Valve.

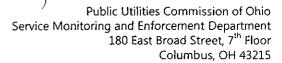
Narrative Summary (include a summary of findings and suggestions to prevent future recurrences if any):

On Saturday, March 21st, 2015 at 2:47 pm an explosion occurred at 3418 Sunningdale Way, Upper Arlington, Ohio. This explosion was caused by a release of natural gas from an improperly abandoned natural gas service line that was installed in 1960 and taken out of service some time between 1985 and 1997. The curb box valve for this line was misidentified as a water valve and operated on Friday, March 20th leading to the gas release and subsequent explosion. A time line of events is below:

On Thursday, March 12th, 2015 the homeowners at 3418 Sunningdale Way contracted with a plumber to repair a leaking water valve in their basement. The plumber arranged for the Columbus Water Department (CWD) to turn off water service to the property so he could make repairs.

On Friday, March 13th, 2015 a CWD employee arrived at the property to disconnect service. The CWD work order noted the water valve box was located in the driveway apron (driveway valve box), but upon arrival at the property the CWD employee discovered there were two separate water boxes present. Investigation later revealed that the actual water line was located approximately 15 to 20 feet south of the driveway with a valve box located on the street side edge of the sidewalk (sidewalk valve box), while the driveway valve box housed a valve for an improperly abandoned gas service line originally installed in 1960.

The CWD employee opened both valve box lids (both labeled "water"), breaking the driveway valve box lid while attempting to remove it. He then operated the sidewalk valve and confirmed the water to the property was in fact turned off by operating an outside spigot. After this he painted the sidewalk valve box lid blue to aid in future identification, and replaced the broken driveway valve box lid with an unpainted (black) lid labeled "water".





The plumber arrived at the property later in the day, confirmed the water was off, and replaced the leaking water valve in the property basement. He then contacted CWD at approximately 1:00 pm to have the water turned back on. CWD informs him that they had nobody to dispatch at that time, and then at approximately 3:00 pm called back and gave him verbal permission to turn the water back on. The plumber then opened the sidewalk valve to restore service.

On Monday, March 16th, 2015 a CWD inspector arrived at the property to inspect the completed work. He noted that the repair was done using a copper coupling manufactured by Propress that the inspector believed was not approved for use. The inspector notified the homeowners that the Propress coupling was not an approved fitting and gave them 21 days to make corrections or their water would be shut off.

On Tuesday, March 17th, 2015, after being informed of the inspection results by the homeowners, the plumber spoke with a supervisor at CWD and explained that the homeowners were leaving on an extended vacation starting on Thursday, March 19th, 2015. During that conversation, the CWD Supervisor stated the Propress coupling was in fact an approved fitting and could be used for the repair. After contacting the homeowners and explaining the situation, it was decided that the plumber would contact CWD to have the water shut off to the residence while they were away on their extended vacation as a precaution.

On Friday, March 20th, 2015 a different CWD employee was dispatched and arrived at 7:35 am to turn off the water to the property. The CWD work order (Work Order #11603429) again incorrectly noted that the water valve box was located in the driveway apron. The CWD employee opened the unpainted valve box in the driveway apron and noted there was approximately 10"-12" of gravel covering the valve. After removing the gravel, he began to operate the valve using a curb key, a device approximately 6 feet long that is used to operate buried valves. While trying to operate the valve, he noticed the painted blue water box lid in the sidewalk, approximately 15 to 20 feet away. He then attempted to return the driveway valve to its original position, called the plumber to verify the sidewalk valve was the correct valve, and then turned off water service to the property. Later investigation revealed the driveway valve was not fully closed, allowing gas to leak by the valve.

On Saturday, March 21st, 2015 a U.S. Postal Service employee noticed a strong smell of natural gas at the property while delivering mail. He reported it to the next door neighbor who contacted Columbia Gas of Ohio (COH) at 12:09 pm. After COH was notified, a Service Technician was dispatched at 12:11 pm and arrived at the property at 12:38 pm. The technician then attempted to determine the location of a gas leak following COH procedures, found a reading of 19% gas in air against the building foundation, and reported his findings that a hazardous leak was found at the property at 2:18 pm. COH dispatched a repair crew at 2:40 pm, who was on their way to the property when the explosion occurred at 2:47 pm. The Upper Arlington Fire Department received the first alarm at 2:48 pm and arrived at 2:52 pm. They had control of fire at 3:56 pm and the last unit was cleared at 10:51 pm.

After the fire was put out an apparent gas fed flame continued to burn around the cinder block foundation near the location of the gas meter (adjacent to the property garage). COH physically disconnected the gas service at approximately 8:00 pm, but the gas fed flame kept burning and showed no signs of receding. COH then drilled additional bar holes on the property to determine if gas was migrating from the gas main or possibly another source (Appendix M). No gas readings were detected except at the building foundation where 100% gas was detected.

COH then prepared to dig an exploratory trench near the property sidewalk to determine if gas may have been following a possible utility or drainage conduit to the foundation. Before beginning excavation, the water service was turned off to avoid flooding the trench if the water line was hit. When COH operated what they believed to be the water valve in the driveway apron, the flame went out. Investigation revealed that this valve was in fact the curb valve for an abandoned service line still connected to the gas main and was the source of gas that led to the explosion.

CONCLUSION

After investigating the events leading to the gas explosion at 3418 Sunningdale Way, Upper Arlington, Staff concludes that the explosion was caused by the following events:



- 1. At some point in time, the original service line at the property was shut off due to a corrosion leak and a new tap and plastic service line was installed (Appendix FF). The new line was installed during the time a previous owner of the property lived there, between 1985 and 1997. The old service line was not properly abandoned. The service line remained connected to the main, and COH procedures in effect at the time state "the service line shall be cut off at the main". In addition, when the threaded steel riser was removed from the old service line, the end of the service line was not plugged or sealed as required by the COH procedures that were in effect at the time.
- 2. On October 18th, 1990, the Columbus Water Department created a second water tap card for 3418 Sunningdale Way that identified a water service with an install date of 10/18/1990 and a valve "4' E of curb in driveway apron" as their water curb valve (Appendix X). The location of the identified water curb valve matches the location of the driveway valve box covering the curb valve to the abandoned gas service line. It is unclear at this time why this second tap card was created by CWD.
- 3. On March 20th, 2015, the curb valve for the improperly abandoned natural gas line was operated by a CWD employee while attempting to disconnect water service to the property. The valve was operated due to its misidentification as a water valve, and the valve was not fully returned to its original closed position when the error was recognized. This allowed natural gas from the COH main operating at 7 psig to flow freely through the abandoned line and exit against the foundation wall. Gas flowed from approximately 8:00 am on Friday, March 20th to the time of the explosion at 2:47 pm on Saturday, March 21st, allowing the gas to build up to an explosive concentration.

Staff further concludes that the following violations of the Pipeline Safety Regulations (49 C.F.R. 192) caused or contributed to this incident:

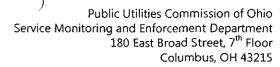
192.13(c) Each operator shall maintain, modify as appropriate, and follow the plans, procedures, and programs that it is required to establish under this part.

Columbia Gas of Ohio did not follow their Operation and Maintenance procedure 640-2 – Installation and Abandonment of Service Lines. This procedure that was in effect at the time of the service line abandonment states "the service line shall be cut off at the main, and all open ends of the abandoned pipe plugged or sealed". The procedure further states "the curb box shall be removed unless it is located in concrete or paving and cannot be removed. In this case, the curb box lid shall be removed and the curb box filled with concrete or similar material". Finally, the procedure states "Upon completion of any work on a Company service line, Form C 2641, "Service Line Order" (SLO) shall be completed". There is no record of this form being completed and COH records still show the SLO, or "tap card" for the service line at 3418 Sunningdale Way to be the original service line installed in 1960.

192.727 (d) Whenever service to a customer is discontinued, one of the following must be complied with:

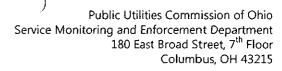
- (1) The valve that is closed to prevent the flow of gas to the customer must be provided with a locking device or other means designed to prevent the opening of the valve by persons other than those authorized by the operator.
- (2) A mechanical device or fitting that will prevent the flow of gas must be installed in the service line or in the meter assembly.
- (3) The customer's piping must be physically disconnected from the gas supply and the open pipe ends sealed.

Columbia Gas of Ohio did not properly discontinue service at 3418 Sunningdale Way in Upper Arlington, Ohio. The curb valve was closed to prevent the flow of gas to the customer but no means to prevent the opening of the valve by persons other than those authorized by COH was provided. The service line remained connected to the gas main, and the open pipe end was not sealed.



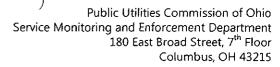


	\boldsymbol{D}	rug/Alcohol Testing			N/A
Operator Drug Program Co	de systematical and the second	TO A PRODUCE A MARKET OF A CO. A LAMBORED TRADEOUS	ogogica i satisti presidenti della persona di la di-	radio raman a di ilayo ila	<u>a di Sira</u> ka di Afrika.
Operator Alcohol Program	Contact & Phone #: Don	na Hefner - (219) 647-4391	· · · · · · · · · · · · · · · · · · ·		
Were all employees that co	_	e incident, post-accident tes	ted within the 8 hou	r time frame fo	r alcohol or the
Inh Dunation	Took Date & Time	Location	Results	Тур	e of Drug
Job Function	Test Date & Time	Location	Pos Ne	g	
Service Technition	Collection 18:36	Riverside - 3535 Olentan	gy 🗌 🗵] N/A	
]	
]	•
]	
		perating Pressures :			N/A
Max. Allowable Operating			n of MAOP: Five ye	ar operating w	Name of Arthur Commence of the Contract of
Actual Operating Pressure	: 7.0 psig				
Method of Over Pressure I	Protection: District Regula	tor Stations - Refer to Appe	ndix B		
Relief Valve Set Point: Mu	ultiple Feed	Capacity Ade	equate? Yes	☐ No	
	7	time of Eallure @ Failu	AND INCOME THE PROPERTY OF THE	10	Ma Na
Pressure @ Failure Site: 7		L	@ Failure Site: 860'	Т	
	Pressure Readings @ V	1			om Failure Site
	.P./Station #	Pressure (psig)	Elevation (ft msl)	Upstream	Downstream
3418 Sunni	ngdale Way	7.0 psig	860'	ļ	
 					
		Pipe Data			□ N/A
Material: Idle Service - Ba	are Steel		ess/SDR: 1/4"	a com the court of the good	es <u>a - A hang promingense (den)</u> 480 hhyddy <u>ethiod F.</u> (
Diameter (O.D.): 1.77"		Installation I	Date: 1960 +/-		
SMYS: N/A		Manufacture	r: N/A		<u> </u>
Longitudinal Seam: N/A		Type of Coa	ting: Bare		
Pipe Specifications (API 5	5L, ASTM A53, etc.): N/A				



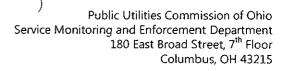


Commonant Failade	omponent Failure Description 🗵 N/A
Component Failed:	
Manufacturer:	Model:
Pressure Rating:	Size:
Comments:	
water and the second	Outside Force Damage Start in the State of t
Responsible Party:	Telephone No.:
Address:	
Work Being Performed:	
Equipment Involved:	Called One Call System? Yes No
One Call Name:	One Call Report #:
Notice Date:	Time:
Response Date:	Time:
Details of Response:	
Was Location Marked According to Procedure	:s? ☐ Yes ☐ No
Was Location Marked According to Procedure	
Was Location Marked According to Procedure Pipeline Marking Type:	es? Yes No
Pipeline Marking Type:	Location:
Pipeline Marking Type: State Law Damage Prevention Program Follow	Location: wed? Yes No No State Law
Pipeline Marking Type: State Law Damage Prevention Program Follow	Location: wed? Yes No No State Law



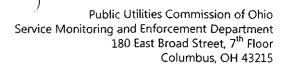


Failure Iso	lation N/A			
Squeeze Off/Stopple Location and Method: Curb Valve off at 21:15				
Valve Closed - Upstream: N/A	I.D: N/A			
Time: N/A	Milepost: N/A			
Valve Closed - Downstream: N/A	I.D.: N/A			
Time: N/A	Milepost: N/A			
Pipeline Shutdown Method: Manual Auton	natic SCADA Controller ESD			
Failed Section Bypassed or Isolated: Isolated				
Performed By: COH	Valve Spacing: N/A			
Class Location/High Con	sequence Area			
Class Location: 1 2 3 4 Determination:	HCA Area? Yes No N/A Determination:			
Odorization Required? Yes No N/A				
The Marian Contract of the Con	ion is the way of the NAS			
Gas Odorized: Yes No	Concentration of Odorant – Sniff Test (Post Incident at Failure Site): Next Door - 3430 Sunningdale Way - 0.2% 17:15			
Type of Odorizer(Wick, By-pass, Pulse):	Heath/Bacharach Unit Used: Bacharach			
N/A	Additional Address: 3430 Sunningdale Way Reading: 0.05%			
Odorizer Manufacturer: N/A	Additional Address: Reading:			
	Additional Address:			
	Reading:			
Odorant Manufacturer: N/A	OQ Individual Performing Sniff Test:			
Type of Odorant: Mercaptan	Sniff Test(s) Monitoring Interval (Monthly): Monthly Throughout operaing area Refer to Appendix D, E, and Q).			
	m: N/A I.D: N/A Milepost: N/A			
Mailman asked neighbor to report gas odor prior to incident at 12:	09 pm, Saturday, March 21, 2015.			





		Weather Co	nditions		□ NA
Temperature: 52 F			Wind (Direction	a & Speed): 10 MPH fro	om west
Climate (Snow, Rain): Clea	ır		Humidity: 68%	· · ·	
Was Incident preceded by a	rapid weather c	hange? Yes	⊠ No		
Weather Conditions Prior to Clear Day (Refer to Append	· ·	l Cover, Ceiling Heig	ghts, Snow, Rain, F	Fog):	
		⊈ ⊊ Gas Migratio	n Survey		
Bar Hole Test of Area:	Yes 🗌 No		Equipment Use	d: Sensit Gold - CGI	
Method of Survey (Foundati Refer to Appendix M Pre Incident - 19% at foundati Post Incident - All mains an	ation wall. Wait	ing of Plant Crew	ŕ		
		Pressure Tes			
	Test Date	Test Medium	Pressure (psig)	Duration (hrs)	% SMYS
Installation	1960	Air	10.0 psig	5 minute	
Next					
Next					
Most Recent					
Describe any problems expe Refer to Appendix C	rienced during t	he pressure tests:			
i e de la composición		Maps & R	ecords		NASS.
Are Maps and Records Curr Comments: Appendix I	rent? 🛚 🔀 Ye:			and the second s	
		e de la composition	. H		LT XIVE
Look Survey History (T	1 A malura - 1	Leak Survey	ATTAINED TO WARRING AND THE	N. I. I	□ N/A
Leak Survey History (Trend 3/21/15 - Supplemental Sur Appendix H - Leakage Hist	vey are immedia				i immediate area.
	<u>.</u>		0		





Additional Actions Taken by the Operator Make notes regarding the emergency and Failure Investigation Procedures (Pressure reduction, Reinforced Squeeze Off, Clean Up Use of Evacuators, Line Purging, closing Additional Valves, Double Block and Bleed, Continue Operating downstream Pumps): April 10, 2015, COH ran a camera inside their exisiting steel main line on Sunningdale Way to verify the inside integrity of their main.			
Checklist for Additional Information:			
⊠Witness names	☐ Name of Injuries	☐ Leak Survey	
Fire Dept. Responding	☐ Time operator notified	☑ Drug & Alcohol Testing	
☐ Fire Dept Investigator	☐ Time operator arrived	Corrosion Reads	
☐ Cause of Leak	☐ What failed	⊠ Possible Flow Rate Study	
☑ Odorization test at site	Odorization History	☐ Pressure Charts	
Source of Ignition	☐ CGI Bare Hole Survey		
Sniff Testing To Verify Odorant	⊠ FI Study	Map of Facilities	
☐ How operator made safe	☐ Time operator made site safe	☑ Prior Service History	
Site Pressure test records	Possible smoke test	Past Pressure Test Records	
Control Room Log	☑ Meter Readings	⊠ Prior Leak surveys	
☐ Was One Call Notified	☑ Photo Documentation (yours, operator, news, neighbors, etc.)	Recent odor complaints	
Construction activity in the incident area	(yours, operator, news, neighbors, etc.)		
Notes: N/A			



Contact information for persons re	levant to the investigation	
Name	Title	Phone Number
Rob Smith	Compliance Manager	
Jeff Young	Fire Chief - Upper Arlington	
Ben Anders	Fire Marshall - Upper Arlington	
Rick Westerfield	Director - Columbus Water Department	
	Plumbing	
Ishida	Homeowners	

	Event Eog. 1 Event Eog
Sequence of events Department and Po	prior, during, and after the incident by time. (Consider the events of all parties involved in the incident, Fire lice reports, Operator Logs and other government agencies.)
Time / Date	Event
	REFER TO SUMMARY
	• • • • • • • • • • • • • • • • • • • •



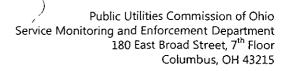
#	Description	#	Description
1	Photos taken on 3/21/2015	16	
2	Photos taken on 3/23/2015	17	4
3	Photos water dept. tools used day of incident - 4/16/2015	18	
4	Photos for outside examination on 4/13/2015	19	
5	Photos for inside examination on 5/12/2015	20	
6	Photos for SEA lab on 6/25/15	21	9*
7 : 4	- 1	22	i (
8		23	
9		24	
10		25	
11		26	
12		27	
13		28	
14		29	
15		30	



Operator:	Failure Investigation Documentation Log Unit #: CPF #:		Date	
Appendix	Documentation Description	Date	FC)IA
Number	Documentation Description	Received	Yes	No
Α	Mainline data at/near incident site	6/26/15		
В	Pressure chart for regulator stations	6/26/15		
C	Old idle service – pressure test main and service	6/26/15		
D	Odorization report day of incident	6/26/15		
E	Odorization report for 2014	6/26/15		
F	Weather report day of incident	6/26/15		
G	Leakage report day of incident	6/26/15		
H	Leakage history report	6/26/15		
I	Map of system	6/26/15	. 1	
J	Aerial view incident site	6/26/15		-
K	Remote read data from meter at incident site	6/26/15		
 L	Tap card for old idle service	6/26/15		
M	Bar hole report and plotted map around incident site	6/26/15		
N	OQ for individuals	6/26/15		
0	Drug / Alcohol – for employees involved in incident	6/26/15		
P	Timeline of events performed by COH	6/26/15		
Q	Calibration of Odorator unit	6/26/15		
R	Calibration of leakage equipment	6/26/15		
S	TP reading at incident site	6/26/15		
T	Inside of main - tap photos	6/26/15		-
U	O & M procedures from 1980 to 1990 – How to abandon service lines	6/26/15		_
V	Audio from interview	4/27/15		
W	Police – Dash cam video	4/17/15		
X	Water Dept. information	4/6/15		
Y	Water Dept. information	4/14/15		
Z	Sign in for outside examination	4/13/15		
AA	Sign in for inside examination	5/12/15		
BB	2013 Curb and sidewalk replacement in neighborhood for incident site	4/17/15		
CC	Plumber - written statement	4/2/15		
DD	Interview by email with current homeowners (Ishida's)	3/26/15		<u> </u>
EE	Franklin County Recorder – previous homeowner list	4/15/15	·	
FF	Written statement by	4/27/15		



Operator:		Unit #:	CPF #:		Date	:
Appendix	Door	Documentation Description		Date	FC	DIA
Number	Docu			Received	Yes	No
GG	NRC report		3/26/15			
НН	-COH employee statement		6/26/15			
II	Timeline from water dept.		4/2/15			
JJ	Upper Arlington Fire Dept. report		4/10/15			
KK	Sign-in sheet for SEA lab wo	ork on material from i	ncident site	6/29/15		
LL	signed statemen	t (neighbor		4/10/15		





Based on the r Code cause or		_	, did violations of the Pi	peline Safety Reg	ulations or Ohio	Administrative	
Code Section		Violation					
192.13 (c)	Operator	Operator did not follow Operation and Maintenance Procedures					
192.727 (d) Operator did not properly discontinue old idle service line							
	***				***************************************		
		3	ह श्री				
		•					
Investiga	ntor(s): Mícha	el F. Purceil II and	Paul W. Hollinger	Date:	July 17, 2015	_	
Reviewed by: Peter A. Chace, GPS Program Manager				Date:	July 24, 2015	_	