ATTACHMENT F

PPL companies

RECEIVED

JAN 23 2012

PUBLIC SERVICE COMMISSION

LG&E and KU Energy LLC
Law Department
220 West Main Street
P.O. Box 32030
Louisville, Kentucky 402
www.lge-ku.com

Jim Dimas
Senior Corporate Attorney
T 502-627-3712
F 502-627-3367
Jim.dimas@lge-ku.com

January 20, 2012

Mr. Jason Brangers
Manager, Gas and Pipeline Safety Branch
Kentucky Public Service Commission
211 Sower Blvd.
P.O. Box 615
Frankfort, KY 40602

Re: 5206 River Trail Place
Louisville, KY 40299
11-ED-G-031

Dear Mr. Brangers:

Enclosed are additional documents as requested by you in connection with the above referenced incident.

We are unable to provide a summary of facts discussed in the interviews conducted by Keith McBride with LG&E personnel, because no such document currently exists. However, we refer you back to our original 30-day Incident Report (report number indicated above) which is our best summary of events and of the interviews conducted on the day of the incident.

If you need additional information concerning this incident, please contact me at (502) 627-3712 so I can direct your request to the appropriate person.

Sincerely,

Jim Dimas/mn

Jim Dimas

JD/mn

Enclosure

16. MAOP and Typical Operating Pressure Prior to Uprate

    (For this portion of the system.)

17. Baseline Public Awareness Messages

18. Manuals

    A) Operation and Maintenance Manual

    B) Emergency Manual

19. Training Materials Regarding Outside Odor Complaints

    A) Abnormal Operating Conditions 2011

    B) Hands-On for Leaks with Questions

    C) Original Leak Detection Class for OQMI On First Qualification

    D) 8-Hour Leak Investigation Class – July 2011

MAOP and Typical Operating Pressure

After Uprate, and Actual Operating Pressure

(For this portion of the system at the time of the incident.)

MAOP and Typical Operating Pressure After Uprate

And Actual Operating Pressure

The MAOP for this system prior to the uprate was 35 psig. The typical operating pressure for this system prior to the uprate was 35 psig.

The MAOP for this system after the uprate is 60 psig. The typical operating pressure for this system after the uprate is 60 psig.

Preston and Southpark District Regulator Facility
Outlet Pressure Hourly Readings for 12/1/2011 - 12/26/2011

Date/Time	Pressure Average (psig)
12/26/2011 23:00	60
12/26/2011 22:00	59.9
12/26/2011 21:00	59.9
12/26/2011 20:00	59.9
12/26/2011 19:00	59.7
12/26/2011 18:00	59.7
12/26/2011 17:00	59.8
12/26/2011 16:00	59.8
12/26/2011 15:00	59.7
12/26/2011 14:00	59.6
12/26/2011 13:00	59.6
12/26/2011 12:00	59.3
12/26/2011 11:00	59.1
12/26/2011 10:00	58.8
12/26/2011 9:00	58.8
12/26/2011 8:00	58.9
12/26/2011 7:00	59
12/26/2011 6:00	59.2
12/26/2011 5:00	59.5
12/26/2011 4:00	59.4
12/26/2011 3:00	59.5
12/26/2011 2:00	59.5
12/26/2011 1:00	59.6
12/26/2011 0:00	59.6
12/25/2011 23:00	59.7
12/25/2011 22:00	59.7
12/25/2011 21:00	59.7
12/25/2011 20:00	60
12/25/2011 19:00	60.1
12/25/2011 18:00	60.3
12/25/2011 17:00	60.4
12/25/2011 16:00	60.4
12/25/2011 15:00	60.3
12/25/2011 14:00	60.1
12/25/2011 13:00	60
12/25/2011 12:00	59.7
12/25/2011 11:00	59.4
12/25/2011 10:00	59
12/25/2011 9:00	59
12/25/2011 8:00	59.1
12/25/2011 7:00	59.3
12/25/2011 6:00	59.4

12/25/2011 5:00	59.4
12/25/2011 4:00	59.5
12/25/2011 3:00	59.6
12/25/2011 2:00	59.6
12/25/2011 1:00	59.6
12/25/2011 0:00	59.7
12/24/2011 23:00	59.6
12/24/2011 22:00	59.7
12/24/2011 21:00	59.8
12/24/2011 20:00	59.9
12/24/2011 19:00	59.9
12/24/2011 18:00	60.1
12/24/2011 17:00	60.2
12/24/2011 16:00	60
12/24/2011 15:00	60.1
12/24/2011 14:00	60
12/24/2011 13:00	59.7
12/24/2011 12:00	59.5
12/24/2011 11:00	59.3
12/24/2011 10:00	58.9
12/24/2011 9:00	58.9
12/24/2011 8:00	59
12/24/2011 7:00	59.2
12/24/2011 6:00	59.3
12/24/2011 5:00	59.4
12/24/2011 4:00	59.5
12/24/2011 3:00	59.5
12/24/2011 2:00	59.5
12/24/2011 1:00	59.7
12/24/2011 0:00	59.7
12/23/2011 23:00	59.6
12/23/2011 22:00	59.6
12/23/2011 21:00	59.6
12/23/2011 20:00	59.6
12/23/2011 19:00	59.6
12/23/2011 18:00	59.6
12/23/2011 17:00	59.6
12/23/2011 16:00	59.6
12/23/2011 15:00	59.6
12/23/2011 14:00	59.6
12/23/2011 13:00	59.6
12/23/2011 12:00	59.5
12/23/2011 11:00	59.5
12/23/2011 10:00	59.5
12/23/2011 9:00	59.5
12/23/2011 8:00	59.5
12/23/2011 7:00	59.5

12/23/2011 6:00	59.6
12/23/2011 5:00	59.8
12/23/2011 4:00	59.7
12/23/2011 3:00	59.8
12/23/2011 2:00	59.8
12/23/2011 1:00	59.9
12/23/2011 0:00	59.9
12/22/2011 23:00	59.8
12/22/2011 22:00	59.7
12/22/2011 21:00	59.7
12/22/2011 20:00	59.7
12/22/2011 19:00	59.6
12/22/2011 18:00	59.6
12/22/2011 17:00	59.6
12/22/2011 16:00	59.6
12/22/2011 15:00	59.6
12/22/2011 14:00	59.6
12/22/2011 13:00	59.6
12/22/2011 12:00	59.6
12/22/2011 11:00	59.5
12/22/2011 10:00	59.5
12/22/2011 9:00	59.5
12/22/2011 8:00	59.4
12/22/2011 7:00	59.5
12/22/2011 6:00	59.6
12/22/2011 5:00	59.8
12/22/2011 4:00	59.8
12/22/2011 3:00	59.9
12/22/2011 2:00	60.1
12/22/2011 1:00	60.1
12/22/2011 0:00	60
12/21/2011 23:00	59.9
12/21/2011 22:00	60
12/21/2011 21:00	59.9
12/21/2011 20:00	60.1
12/21/2011 19:00	59.9
12/21/2011 18:00	60
12/21/2011 17:00	60.2
12/21/2011 16:00	60.2
12/21/2011 15:00	60.3
12/21/2011 14:00	60.3
12/21/2011 13:00	60.4
12/21/2011 12:00	60.3
12/21/2011 11:00	60.3
12/21/2011 10:00	60.3
12/21/2011 9:00	60.2
12/21/2011 8:00	60.1

12/21/2011 7:00	60.2
12/21/2011 6:00	60.4
12/21/2011 5:00	60.5
12/21/2011 4:00	60.6
12/21/2011 3:00	60.6
12/21/2011 2:00	60.6
12/21/2011 1:00	60.5
12/21/2011 0:00	60.4
12/20/2011 23:00	60.4
12/20/2011 22:00	60.3
12/20/2011 21:00	60.3
12/20/2011 20:00	60.3
12/20/2011 19:00	60.1
12/20/2011 18:00	60.1
12/20/2011 17:00	60.2
12/20/2011 16:00	60.1
12/20/2011 15:00	60.1
12/20/2011 14:00	60
12/20/2011 13:00	59.9
12/20/2011 12:00	59.8
12/20/2011 11:00	59.7
12/20/2011 10:00	59.6
12/20/2011 9:00	59.5
12/20/2011 8:00	59.5
12/20/2011 7:00	59.5
12/20/2011 6:00	59.7
12/20/2011 5:00	59.9
12/20/2011 4:00	60
12/20/2011 3:00	60.1
12/20/2011 2:00	60.1
12/20/2011 1:00	60.2
12/20/2011 0:00	60.2
12/19/2011 23:00	60.2
12/19/2011 22:00	60.1
12/19/2011 21:00	60.1
12/19/2011 20:00	60.1
12/19/2011 19:00	59.9
12/19/2011 18:00	59.9
12/19/2011 17:00	59.9
12/19/2011 16:00	60
12/19/2011 15:00	60.1
12/19/2011 14:00	60
12/19/2011 13:00	60
12/19/2011 12:00	59.9
12/19/2011 11:00	59.9
12/19/2011 10:00	59.8
12/19/2011 9:00	59.7

12/19/2011 8:00	59.5
12/19/2011 7:00	59.6
12/19/2011 6:00	59.7
12/19/2011 5:00	59.8
12/19/2011 4:00	59.8
12/19/2011 3:00	59.9
12/19/2011 2:00	59.9
12/19/2011 1:00	60.1
12/19/2011 0:00	60
12/18/2011 23:00	59.9
12/18/2011 22:00	59.9
12/18/2011 21:00	59.9
12/18/2011 20:00	60
12/18/2011 19:00	60.1
12/18/2011 18:00	60.1
12/18/2011 17:00	60.3
12/18/2011 16:00	60.2
12/18/2011 15:00	60.3
12/18/2011 14:00	60.1
12/18/2011 13:00	60
12/18/2011 12:00	59.7
12/18/2011 11:00	59.4
12/18/2011 10:00	59
12/18/2011 9:00	58.9
12/18/2011 8:00	59
12/18/2011 7:00	59.2
12/18/2011 6:00	59.2
12/18/2011 5:00	59.3
12/18/2011 4:00	59.4
12/18/2011 3:00	59.5
12/18/2011 2:00	59.7
12/18/2011 1:00	59.8
12/18/2011 0:00	59.7
12/17/2011 23:00	59.7
12/17/2011 22:00	59.6
12/17/2011 21:00	59.6
12/17/2011 20:00	59.7
12/17/2011 19:00	59.7
12/17/2011 18:00	59.9
12/17/2011 17:00	60.1
12/17/2011 16:00	60.2
12/17/2011 15:00	60.1
12/17/2011 14:00	59.9
12/17/2011 13:00	59.6
12/17/2011 12:00	59.5
12/17/2011 11:00	59.2
12/17/2011 10:00	58.8

12/17/2011 9:00	58.8
12/17/2011 8:00	59
12/17/2011 7:00	59.1
12/17/2011 6:00	59.2
12/17/2011 5:00	59.1
12/17/2011 4:00	59.2
12/17/2011 3:00	59.3
12/17/2011 2:00	59.3
12/17/2011 1:00	59.3
12/17/2011 0:00	59.3
12/16/2011 23:00	59.2
12/16/2011 22:00	59.3
12/16/2011 21:00	59.3
12/16/2011 20:00	59.4
12/16/2011 19:00	59.3
12/16/2011 18:00	59.3
12/16/2011 17:00	59.4
12/16/2011 16:00	59.4
12/16/2011 15:00	59.6
12/16/2011 14:00	59.7
12/16/2011 13:00	59.6
12/16/2011 12:00	59.5
12/16/2011 11:00	59.5
12/16/2011 10:00	59.4
12/16/2011 9:00	59.4
12/16/2011 8:00	59.2
12/16/2011 7:00	59.4
12/16/2011 6:00	59.6
12/16/2011 5:00	59.7
12/16/2011 4:00	59.6
12/16/2011 3:00	59.7
12/16/2011 2:00	59.8
12/16/2011 1:00	59.9
12/16/2011 0:00	59.9
12/15/2011 23:00	59.9
12/15/2011 22:00	59.9
12/15/2011 21:00	60
12/15/2011 20:00	60.1
12/15/2011 19:00	60.1
12/15/2011 18:00	60.2
12/15/2011 17:00	60.3
12/15/2011 16:00	60.5
12/15/2011 15:00	60.6
12/15/2011 14:00	60.4
12/15/2011 13:00	60.4
12/15/2011 12:00	60.3
12/15/2011 11:00	60.2

12/15/2011 10:00	60.2
12/15/2011 9:00	60
12/15/2011 8:00	59.9
12/15/2011 7:00	60
12/15/2011 6:00	60.3
12/15/2011 5:00	60.5
12/15/2011 4:00	60.7
12/15/2011 3:00	60.7
12/15/2011 2:00	60.7
12/15/2011 1:00	60.6
12/15/2011 0:00	60.5
12/14/2011 23:00	60.3
12/14/2011 22:00	60.2
12/14/2011 21:00	60.2
12/14/2011 20:00	60.2
12/14/2011 19:00	60.2
12/14/2011 18:00	60.3
12/14/2011 17:00	60.4
12/14/2011 16:00	60.5
12/14/2011 15:00	60.6
12/14/2011 14:00	60.5
12/14/2011 13:00	60.4
12/14/2011 12:00	60.2
12/14/2011 11:00	60.1
12/14/2011 10:00	59.9
12/14/2011 9:00	59.8
12/14/2011 8:00	59.6
12/14/2011 7:00	59.7
12/14/2011 6:00	59.8
12/14/2011 5:00	59.9
12/14/2011 4:00	60
12/14/2011 3:00	60.1
12/14/2011 2:00	60.1
12/14/2011 1:00	60.4
12/14/2011 0:00	60.4
12/13/2011 23:00	60.3
12/13/2011 22:00	60.2
12/13/2011 21:00	60.2
12/13/2011 20:00	60.2
12/13/2011 19:00	60.1
12/13/2011 18:00	60.1
12/13/2011 17:00	60.3
12/13/2011 16:00	60.3
12/13/2011 15:00	60.3
12/13/2011 14:00	60.3
12/13/2011 13:00	60.2
12/13/2011 12:00	60.1

12/13/2011 11:00	59.9
12/13/2011 10:00	59.9
12/13/2011 9:00	59.7
12/13/2011 8:00	59.5
12/13/2011 7:00	59.5
12/13/2011 6:00	59.6
12/13/2011 5:00	59.7
12/13/2011 4:00	59.7
12/13/2011 3:00	59.8
12/13/2011 2:00	59.8
12/13/2011 1:00	59.9
12/13/2011 0:00	60
12/12/2011 23:00	59.8
12/12/2011 22:00	59.8
12/12/2011 21:00	59.8
12/12/2011 20:00	59.9
12/12/2011 19:00	60
12/12/2011 18:00	60.2
12/12/2011 17:00	60.4
12/12/2011 16:00	60.4
12/12/2011 15:00	60.3
12/12/2011 14:00	60.1
12/12/2011 13:00	59.8
12/12/2011 12:00	59.4
12/12/2011 11:00	59.1
12/12/2011 10:00	58.8
12/12/2011 9:00	58.5
12/12/2011 8:00	58.3
12/12/2011 7:00	58.4
12/12/2011 6:00	58.7
12/12/2011 5:00	58.9
12/12/2011 4:00	58.8
12/12/2011 3:00	59
12/12/2011 2:00	59.1
12/12/2011 1:00	59.2
12/12/2011 0:00	59.2
12/11/2011 23:00	59.1
12/11/2011 22:00	59.2
12/11/2011 21:00	59.3
12/11/2011 20:00	59.4
12/11/2011 19:00	59.6
12/11/2011 18:00	59.8
12/11/2011 17:00	60
12/11/2011 16:00	59.9
12/11/2011 15:00	60
12/11/2011 14:00	59.8
12/11/2011 13:00	59.6

12/11/2011 12:00	59.3
12/11/2011 11:00	58.9
12/11/2011 10:00	58.4
12/11/2011 9:00	58.3
12/11/2011 8:00	58.4
12/11/2011 7:00	58.5
12/11/2011 6:00	58.6
12/11/2011 5:00	58.8
12/11/2011 4:00	58.9
12/11/2011 3:00	59
12/11/2011 2:00	59.1
12/11/2011 1:00	59.2
12/11/2011 0:00	59.2
12/10/2011 23:00	59.3
12/10/2011 22:00	59.2
12/10/2011 21:00	59.3
12/10/2011 20:00	59.5
12/10/2011 19:00	59.6
12/10/2011 18:00	59.8
12/10/2011 17:00	60
12/10/2011 16:00	60
12/10/2011 15:00	60
12/10/2011 14:00	59.8
12/10/2011 13:00	59.6
12/10/2011 12:00	59.3
12/10/2011 11:00	58.9
12/10/2011 10:00	58.5
12/10/2011 9:00	58.4
12/10/2011 8:00	58.6
12/10/2011 7:00	58.8
12/10/2011 6:00	59
12/10/2011 5:00	59.2
12/10/2011 4:00	59.3
12/10/2011 3:00	59.5
12/10/2011 2:00	59.6
12/10/2011 1:00	59.7
12/10/2011 0:00	59.6
12/9/2011 23:00	59.7
12/9/2011 22:00	59.6
12/9/2011 21:00	59.6
12/9/2011 20:00	59.7
12/9/2011 19:00	59.6
12/9/2011 18:00	59.7
12/9/2011 17:00	59.8
12/9/2011 16:00	60.1
12/9/2011 15:00	60.1
12/9/2011 14:00	59.9

12/9/2011 13:00	59.8
12/9/2011 12:00	59.7
12/9/2011 11:00	59.4
12/9/2011 10:00	59.1
12/9/2011 9:00	58.9
12/9/2011 8:00	58.6
12/9/2011 7:00	58.8
12/9/2011 6:00	59.1
12/9/2011 5:00	59.3
12/9/2011 4:00	59.4
12/9/2011 3:00	59.4
12/9/2011 2:00	59.5
12/9/2011 1:00	59.6
12/9/2011 0:00	59.6
12/8/2011 23:00	59.6
12/8/2011 22:00	59.5
12/8/2011 21:00	59.6
12/8/2011 20:00	59.7
12/8/2011 19:00	59.7
12/8/2011 18:00	59.9
12/8/2011 17:00	60.1
12/8/2011 16:00	60.2
12/8/2011 15:00	60.1
12/8/2011 14:00	60
12/8/2011 13:00	59.9
12/8/2011 12:00	59.7
12/8/2011 11:00	59.6
12/8/2011 10:00	58.7
12/8/2011 9:00	58.2
12/8/2011 8:00	57.9
12/8/2011 7:00	58.1
12/8/2011 6:00	58.3
12/8/2011 5:00	58.4
12/8/2011 4:00	58.4
12/8/2011 3:00	58.6
12/8/2011 2:00	58.7
12/8/2011 1:00	58.8
12/8/2011 0:00	58.8
12/7/2011 23:00	58.7
12/7/2011 22:00	58.6
12/7/2011 21:00	58.7
12/7/2011 20:00	58.7
12/7/2011 19:00	58.6
12/7/2011 18:00	58.7
12/7/2011 17:00	58.9
12/7/2011 16:00	59.1
12/7/2011 15:00	59

12/7/2011 14:00	59.1
12/7/2011 13:00	58.9
12/7/2011 12:00	58.8
12/7/2011 11:00	58.5
12/7/2011 10:00	58.6
12/7/2011 9:00	58.6
12/7/2011 8:00	58.5
12/7/2011 7:00	58.6
12/7/2011 6:00	58.8
12/7/2011 5:00	59
12/7/2011 4:00	59.2
12/7/2011 3:00	59.3
12/7/2011 2:00	59.3
12/7/2011 1:00	59.4
12/7/2011 0:00	59.3
12/6/2011 23:00	59.2
12/6/2011 22:00	59.1
12/6/2011 21:00	59.1
12/6/2011 20:00	59.1
12/6/2011 19:00	59
12/6/2011 18:00	58.8
12/6/2011 17:00	58.8
12/6/2011 16:00	59
12/6/2011 15:00	59.2
12/6/2011 14:00	59.2
12/6/2011 13:00	59.2
12/6/2011 12:00	59.2
12/6/2011 11:00	59.2
12/6/2011 10:00	59.1
12/6/2011 9:00	58.9
12/6/2011 8:00	58.7
12/6/2011 7:00	58.8
12/6/2011 6:00	59.2
12/6/2011 5:00	59.4
12/6/2011 4:00	59.6
12/6/2011 3:00	59.7
12/6/2011 2:00	59.8
12/6/2011 1:00	59.8
12/6/2011 0:00	59.8
12/5/2011 23:00	59.7
12/5/2011 22:00	59.5
12/5/2011 21:00	59.5
12/5/2011 20:00	59.6
12/5/2011 19:00	59.5
12/5/2011 18:00	59.5
12/5/2011 17:00	59.6
12/5/2011 16:00	59.8

12/5/2011 15:00	59.9
12/5/2011 14:00	59.8
12/5/2011 13:00	59.8
12/5/2011 12:00	59.7
12/5/2011 11:00	59.8
12/5/2011 10:00	59.8
12/5/2011 9:00	59.7
12/5/2011 8:00	59.4
12/5/2011 7:00	59.6
12/5/2011 6:00	59.9
12/5/2011 5:00	60.1
12/5/2011 4:00	60.2
12/5/2011 3:00	60.3
12/5/2011 2:00	60.3
12/5/2011 1:00	60.3
12/5/2011 0:00	60.2
12/4/2011 23:00	60.1
12/4/2011 22:00	60
12/4/2011 21:00	59.9
12/4/2011 20:00	60
12/4/2011 19:00	59.9
12/4/2011 18:00	60
12/4/2011 17:00	60
12/4/2011 16:00	60.1
12/4/2011 15:00	60.1
12/4/2011 14:00	60
12/4/2011 13:00	59.9
12/4/2011 12:00	59.8
12/4/2011 11:00	59.5
12/4/2011 10:00	59.3
12/4/2011 9:00	59.3
12/4/2011 8:00	59.4
12/4/2011 7:00	59.5
12/4/2011 6:00	59.6
12/4/2011 5:00	59.7
12/4/2011 4:00	59.8
12/4/2011 3:00	59.8
12/4/2011 2:00	59.8
12/4/2011 1:00	59.8
12/4/2011 0:00	59.8
12/3/2011 23:00	59.8
12/3/2011 22:00	59.8
12/3/2011 21:00	59.8
12/3/2011 20:00	59.9
12/3/2011 19:00	60
12/3/2011 18:00	60.2
12/3/2011 17:00	60.3

12/3/2011 16:00	60.2
12/3/2011 15:00	60.2
12/3/2011 14:00	60
12/3/2011 13:00	59.6
12/3/2011 12:00	59.3
12/3/2011 11:00	59.1
12/3/2011 10:00	58.6
12/3/2011 9:00	58.3
12/3/2011 8:00	58.5
12/3/2011 7:00	58.6
12/3/2011 6:00	58.7
12/3/2011 5:00	58.8
12/3/2011 4:00	58.9
12/3/2011 3:00	59
12/3/2011 2:00	59.1
12/3/2011 1:00	59.3
12/3/2011 0:00	59.3
12/2/2011 23:00	59.3
12/2/2011 22:00	59.3
12/2/2011 21:00	59.4
12/2/2011 20:00	59.5
12/2/2011 19:00	59.7
12/2/2011 18:00	59.9
12/2/2011 17:00	60.1
12/2/2011 16:00	60.1
12/2/2011 15:00	60
12/2/2011 14:00	59.8
12/2/2011 13:00	59.5
12/2/2011 12:00	59.1
12/2/2011 11:00	58.9
12/2/2011 10:00	58.6
12/2/2011 9:00	58.4
12/2/2011 8:00	58.3
12/2/2011 7:00	58.4
12/2/2011 6:00	58.5
12/2/2011 5:00	58.7
12/2/2011 4:00	58.7
12/2/2011 3:00	58.8
12/2/2011 2:00	58.9
12/2/2011 1:00	59.1
12/2/2011 0:00	59.1
12/1/2011 23:00	59.1
12/1/2011 22:00	59.1
12/1/2011 21:00	59.2
12/1/2011 20:00	59.4
12/1/2011 19:00	59.5
12/1/2011 18:00	59.9

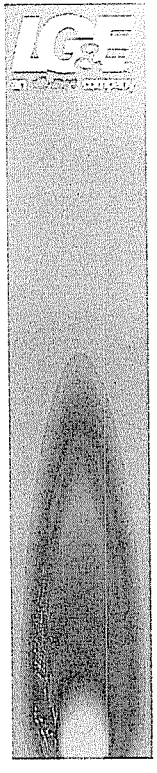
12/1/2011 17:00	60.1
12/1/2011 16:00	60.1
12/1/2011 15:00	60
12/1/2011 14:00	59.9
12/1/2011 13:00	59.5
12/1/2011 12:00	59
12/1/2011 11:00	58.8
12/1/2011 10:00	58.5
12/1/2011 9:00	58.3
12/1/2011 8:00	58.1
12/1/2011 7:00	58.2
12/1/2011 6:00	58.4
12/1/2011 5:00	58.5
12/1/2011 4:00	58.7
12/1/2011 3:00	58.7
12/1/2011 2:00	58.8
12/1/2011 1:00	59
12/1/2011 0:00	59.1

Baseline Public Awareness Messages

Public Awareness Bill Inserts - River Trail Place

Powersource Newsletter Bill Inserts		
Topic	Month/Year	Date Bill Mailed
Kentucky 811	May 2010	May 6 - May 8, 2010
Brass Connectors	September 2010	September 3, 2010
Carbon Monoxide/Space Heaters	October 2010	October 5, 2010
Kentucky 811	April 2011	April 4, 2011
Brass Connectors	December 2011	December 6, 2011
Public Awareness Specific Bill Inserts		
Topic	Month/Year	Date Bill Mailed
Public Awareness Baseline Message	May 2010	May 6 - May 8, 2010
Public Awareness Baseline Message	October 2010	October 5, 2010
Public Awareness Baseline Message	May 2011	May 4, 2011
Public Awareness Baseline Message	November 2011	November 3, 2011

Notes: Date Bill Mailed data from 5206 River Trail Place and 5129 Queens Castle Road.
May 2010 Date Bill Mailed estimated based on meter reading date of May 5, 2010.



Natural gas and pipeline safety: Be aware!

Our underground pipelines are the safest, most efficient way to deliver natural gas to your home. Underground gas pipelines can be hard to detect, and we sometimes mark pipelines with brightly colored sign posts in areas where pipelines may be more susceptible to damages. You may not even notice them, but it is important to remember precautions to keep our community safe.

Look for markers

Residential and commercial development in once rural areas is encroaching on pipeline rights-of-way (ROW) with increasing frequency. Encroachment implies safety concerns for local residents and for the physical integrity of the pipeline itself. To help prevent encroachment and excavation-related damage to pipelines, we install brightly-colored sign posts along the pipeline (ROW) to indicate the presence of – **but not necessarily the exact location of** – underground pipelines. Markers come in a variety of shapes and sizes. They contain information about the nearby pipeline as well as **emergency contact information**.

Due to the safety needs surrounding pipelines, community and governmental decisions regarding land use may affect pipelines and public safety. Everything possible should be done to keep ROWs as free of physical encumbrances as possible in order to ensure reasonable and frequent visual inspections of the pipeline from the air and ground. In addition, a clear ROW helps ensure ease of access for repairs.

Dig with care

Before doing any digging, everyone, including the general public, should have the location of underground utilities in the area marked. Call Kentucky 811 (dial 8-1-1). They will coordinate with Kentucky 811 member utilities in the area to have their underground lines marked free of charge to the caller. The process to notify Kentucky 811 member utilities is designed to protect the public and the property. It requires that you:

1. **Call 8-1-1** at least two business days prior to excavation.
2. **Wait** until the lines have been marked before you begin digging.
3. **Respect the marks.**

If you see digging in an area where buried utility lines have not been located (paint on the ground or flags placed in the grass), protect yourself and your neighbors by reporting it immediately to us at 502-627-4427. Provide the address where the excavation is occurring and the name of the company or individual doing the excavating.

Leak Detection

LG&E performs regular leak surveys of its gas distribution system and a distinctive odor is added to the natural gas to aid in identifying gas leaks. Gas odor levels are monitored on a regular basis to ensure adequate levels of the odorant are present in the gas. Although LG&E adds the odorant to natural gas to aid in the detection of leaks, you should not rely solely on your sense of smell to determine if there is a gas leak. Some persons may not be able to smell the odor because they have a diminished sense of smell or because the odor is being masked by other odors in the area. In addition, there may be rare conditions, such as odor fade (loss of odorant) which may occur and cause the odor to diminish so that it is not detectable.

Outdoors – If you live, work or play near a natural gas pipeline, the following signs may help you detect a leak on or near the pipeline right-of-way:

- You may **HEAR** a blowing or hissing sound.
- You may **SEE** dust blowing from a hole in the ground, continuous bubbling in one spot in wet or flooded areas, dead vegetation, abnormally dry or hardened soil or fire appearing as if it is coming from the ground or burning above the ground.
- You may **SMELL** a gaseous or hydrocarbon odor (similar to sulfur or rotten eggs).

If you suspect a gas leak outdoors:

1. Shut down and abandon any equipment being used in or near the area.
2. Avoid open flame or other sources of ignition. Do not start any motor vehicles or electrical equipment.
3. Evacuate the area and prevent unsuspecting people from entering.
4. Notify us at 1-502-589-5511 (1-800-331-7370) immediately so the leak can be verified and necessary corrective action can take place.
5. Get help from local law enforcement officials to isolate the area.
6. Do not attempt to extinguish a natural gas fire. Request the local fire department to protect adjacent property.
7. Do not attempt to operate any pipeline valves.

Indoors – The following signs may help you detect a leak inside a building:

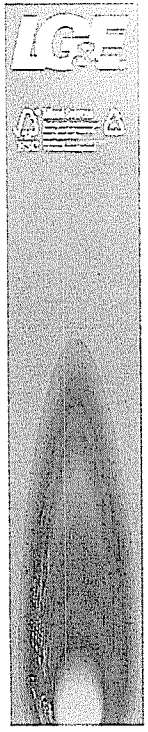
- You may **SMELL** a gaseous or hydrocarbon odor (similar to sulfur or rotten eggs). A faint odor of natural gas may mean that a pilot light has gone out on an appliance and should be re-lit or that there is some other leak or problem present. Open the doors and windows for ventilation. Don't try to re-light a gas furnace, water heater or range until you are sure there is no natural gas left inside the building.
- You or someone in the building may experience dizziness, headache, nausea, fatigue or flu-like symptoms. This could be a sign that a severe natural gas leak or more likely a release of carbon monoxide has occurred, which may be the result of an improperly adjusted natural gas appliance inside your home or workplace.

If you suspect a natural gas leak, **DO NOT** use a telephone or flashlight, switch a light on or off, light a match or create any other ignition source. Leaking natural gas can ignite, so you should immediately leave the house and go to a safe area where there is no indication of a natural gas leak. This may be a neighbor's house. **Call us at 1-502-589-5511 (outside Louisville 1-800-331-7370).** You should do the same thing if you suspect carbon monoxide is present in the home. Carbon monoxide detectors can be purchased from home improvement stores or from various online sources.

LG&E's Integrity Management Program

Safety is our priority at LG&E. For this reason, our lines are monitored and inspected so we can locate and fix potential problems before they occur. We also implement a pipeline integrity management program that includes identifying areas along our pipelines where the consequences of a failure would be significant, conducting inspections to verify the integrity of the pipeline, implementing pipeline safety communications plans, identifying pipeline risks and implementing measures to reduce pipeline risks.

Additional safety information, including emergency preparedness and land use practices is available on our Web site at www.eon-us.com/rsc/lge/gas_safety.asp. You can also **call LG&E at (502) 589-5511 (outside Louisville 800-331-7370) for any natural gas concern or emergency. You can reach us 24 hours a day, 365 days a year.**



Natural gas and pipeline safety: Be aware!

Our underground pipelines are the safest, most efficient way to deliver natural gas to your home. Underground gas pipelines can be hard to detect, and we sometimes mark pipelines with brightly colored sign posts in areas where pipelines may be more susceptible to damages. You may not even notice them, but it is important to remember precautions to keep our community safe.

Look for markers

Residential and commercial development in once rural areas is encroaching on pipeline rights-of-way (ROW) with increasing frequency. Encroachment implies safety concerns for local residents and for the physical integrity of the pipeline itself. To help prevent encroachment and excavation-related damage to pipelines, we install brightly-colored sign posts along the pipeline (ROW) to indicate the presence – **but not necessarily the exact location** – of underground pipelines. Markers come in a variety of shapes and sizes. They contain information about the nearby pipeline as well as **emergency contact information**.

Due to the safety needs surrounding pipelines, community and governmental decisions regarding land use may affect pipelines and public safety. Everything possible should be done to keep ROWs as free of physical encumbrances as possible in order to ensure reasonable and frequent visual inspections of the pipeline from the air and ground. In addition, a clear ROW helps ensure ease of access for repairs.

National Pipeline Mapping System

The National Pipeline Mapping System (NPMS) website at www.npms.phmsa.dot.gov/publicviewer enables users to view NPMS data one county at a time. NPMS data consists of gas transmission pipelines and hazardous liquid trunklines. It does not contain gathering or distribution pipelines, such as lines which deliver gas to an individual customer's home. Therefore, not all pipelines in an area will be visible in the public map viewer. **NPMS data is for reference purposes only. It should never be used as a substitute for contacting Kentucky 8-1-1 prior to excavating. Call 8-1-1 before you dig.**

Dig with care

Before doing any digging, everyone, including the general public, should ensure the locations of underground utilities in the area are marked. Call Kentucky 811 (dial 8-1-1). They will coordinate with Kentucky 811 member utilities in the area to have their underground lines marked free of charge to the caller.

The process to notify Kentucky 811 member utilities is designed to protect the public and the property. It requires that you:

1. **Call 8-1-1** at least two business days prior to excavation.
2. **Wait** until the lines have been marked before you begin digging.
3. **Respect the marks.**

If you see digging in an area where buried utility lines have not been located (paint on the ground or flags placed in the grass), protect yourself and your neighbors by reporting it immediately to us at 502-627-4427. Provide the address where the excavation is occurring and the name of the company or individual doing the excavating.

Leak Detection

LG&E performs regular leak surveys of its gas distribution system and a distinctive odor is added to the natural gas to aid in identifying gas leaks. Gas odor levels are monitored on a regular basis to ensure adequate levels of the odorant are present in the gas.

Although LG&E adds the odorant to natural gas to aid in the detection of leaks, you should not rely solely on your sense of smell to determine if there is a gas leak. Some persons may not be able to smell the odor because they have a diminished sense of smell or because the odor is being masked by other odors in the area. In addition, there may be rare conditions, such as odor fade (loss of odorant) which may occur and cause the odor to diminish so that it is not detectable.

Outdoors – If you live, work or play near a natural gas pipeline, the following signs may help you detect a leak on or near the pipeline right-of-way:

- You may **HEAR** a blowing or hissing sound.
- You may **SEE** dust blowing from a hole in the ground, continuous bubbling in one spot in wet or flooded areas, dead vegetation, abnormally dry or hardened soil or fire appearing as if it is coming from the ground or burning above the ground.
- You may **SMELL** a gaseous or hydrocarbon odor (similar to sulfur or rotten eggs).

If you suspect a gas leak outdoors:

1. Shut down and abandon any equipment being used in or near the area.
2. Avoid open flame or other sources of ignition. Do not start any motor vehicles or electrical equipment.
3. Evacuate the area and prevent unsuspecting people from entering.
4. Notify us at 1-502-589-5511 (1-800-331-7370) immediately so the leak can be verified and necessary corrective action can take place.
5. Get help from local law enforcement officials to isolate the area.
6. Do not attempt to extinguish a natural gas fire. Request the local fire department to protect adjacent property.
7. Do not attempt to operate any pipeline valves.

Indoors – The following signs may help you detect a leak inside a building:

- You may **SMELL** a gaseous or hydrocarbon odor (similar to sulfur or rotten eggs). A faint odor of natural gas may mean that a pilot light has gone out on an appliance and should be re-lit or that there is some other leak or problem present. Open the doors and windows for ventilation. Don't try to re-light a gas furnace, water heater or range until you are sure there is no natural gas left inside the building.
- You or someone in the building may experience dizziness, headache, nausea, fatigue or flu-like symptoms. This could be a sign that a severe natural gas leak or more likely a release of carbon monoxide has occurred, which may be the result of an improperly adjusted natural gas appliance inside your home or workplace.

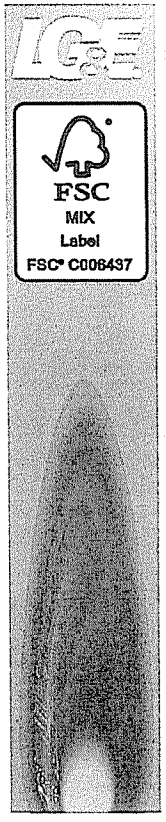
If you suspect a natural gas leak, **DO NOT** use a telephone or flashlight, switch a light on or off, light a match or create any other ignition source. Leaking natural gas can ignite, so you should immediately leave the house and go to a safe area where there is no indication of a natural gas leak. This may be a neighbor's house. **Call us at 1-502-589-5511 (outside Louisville 1-800-331-7370)**. You should do the same thing if you suspect carbon monoxide is present in the home. Carbon monoxide detectors can be purchased from home improvement stores or from various online sources.

LG&E's Integrity Management Program

Safety is our priority at LG&E. For this reason, our lines are monitored and inspected so we can locate and fix potential problems before they occur. We also implement a pipeline integrity management program that includes identifying areas along our pipelines where the consequences of a failure would be significant, conducting inspections to verify the integrity of the pipeline, implementing pipeline safety communications plans, identifying pipeline risks and implementing measures to reduce pipeline risks.

Additional safety information, including emergency preparedness and land use practices is available on our website at www.eon-us.com/rsc/lge/gas_safety.asp. You can also **call LG&E at (502) 589-5511 (outside Louisville 800-331-7370) for any natural gas concern or emergency. You can reach us 24 hours a day, 365 days a year.**

Natural gas and pipeline safety: Be aware!



Our underground pipelines are the safest, most efficient way to deliver natural gas to your home. Underground gas pipelines can be hard to detect, and we sometimes mark pipelines with brightly colored sign posts in areas where pipelines may be more susceptible to damages. You may not even notice them, but it is important to remember precautions to keep our community safe.

Look for markers

Residential and commercial development in once rural areas is encroaching on pipeline rights-of-way (ROW) with increasing frequency. Encroachment implies safety concerns for local residents and for the physical integrity of the pipeline itself. To help prevent encroachment and excavation-related damage to pipelines, we install brightly-colored sign posts along the pipeline (ROW) to indicate the presence – **but not necessarily the exact location** – of underground pipelines. Markers come in a variety of shapes and sizes. They contain information about the nearby pipeline as well as **emergency contact information**.

Due to the safety needs surrounding pipelines, community and governmental decisions regarding land use may affect pipelines and public safety. Everything possible should be done to keep ROWs as free of physical encumbrances as possible in order to ensure reasonable and frequent visual inspections of the pipeline from the air and ground. In addition, a clear ROW helps ensure ease of access for repairs.

National Pipeline Mapping System

The National Pipeline Mapping System (NPMS) website at **www.npms.phmsa.dot.gov** enables users to view NPMS data one county at a time. NPMS data consists of gas transmission pipelines and hazardous liquid trunklines. It does not contain gathering or distribution pipelines, such as lines which deliver gas to an individual customer's home. Therefore, not all pipelines in an area will be visible in the public map viewer. **NPMS data is for reference purposes only. It should never be used as a substitute for contacting Kentucky 8-1-1 prior to excavating. Call 8-1-1 before you dig.**

Dig with care

Before doing any digging, everyone, including the general public, should ensure the locations of underground utilities in the area are marked. Call Kentucky 811 (dial 8-1-1). They will coordinate with Kentucky 811 member utilities in the area to have their underground lines marked free of charge to the caller.

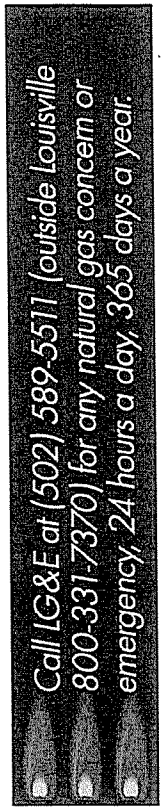
The process to notify Kentucky 811 member utilities is designed to protect the public and the property. It requires that you:

1. **Call 8-1-1** at least two business days prior to excavation.
2. **Wait** until the lines have been marked before you begin digging.
3. **Respect the marks**.

If you see digging in an area where buried utility lines have not been located (paint on the ground or flags placed in the grass), protect yourself and your neighbors by reporting it immediately to us at 502-627-4427. Provide the address where the excavation is occurring and the name of the company or individual doing the excavating.

Leak Detection

LG&E performs regular leak surveys of its gas distribution system and a distinctive odor is added to the natural gas to aid in identifying gas leaks. Gas odor levels are monitored on a regular basis to ensure adequate levels of the odorant are present in the gas.



Although LG&E adds the odorant to natural gas to aid in the detection of leaks, you should not rely solely on your sense of smell to determine if there is a gas leak. Some persons may not be able to smell the odor because they have a diminished sense of smell or because the odor is being masked by other odors in the area. In addition, there may be rare conditions, such as odor fade (loss of odorant) which may occur and cause the odor to diminish so that it is not detectable.

Outdoors – If you live, work or play near a natural gas pipeline, the following signs may help you detect a leak on or near the pipeline right-of-way:

- You may **HEAR** a blowing or hissing sound.
- You may **SEE** dust blowing from a hole in the ground, continuous bubbling in one spot in wet or flooded areas, dead vegetation, abnormally dry or hardened soil or fire appearing as if it is coming from the ground or burning above the ground.
- You may **SMELL** a gaseous or hydrocarbon odor (similar to sulfur or rotten eggs).

If you suspect a gas leak outdoors:

1. Shut down and abandon any equipment being used in or near the area.
2. Avoid open flame and other sources of ignition. Do not start any motor vehicles or electrical equipment.
3. Evacuate the area and prevent unsuspecting people from entering.
4. Notify us at 1-502-589-5511 (1-800-331-7370) immediately so the leak can be verified and if necessary corrective action can take place.
5. Get help from local law enforcement officials to isolate the area.
6. Do not attempt to extinguish a natural gas fire. Request the local fire department to protect adjacent property.
7. Do not attempt to operate any pipeline valves.

Indoors – The following signs may help you detect a leak inside a building:

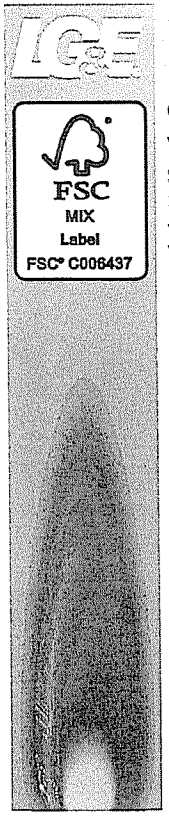
- You may **SMELL** a gaseous or hydrocarbon odor (similar to sulfur or rotten eggs). A faint odor of natural gas may mean that a pilot light has gone out on an appliance and should be re-lit or that there is some other leak or problem present. Open the doors and windows for ventilation. Don't try to re-light a gas furnace, water heater or range until you are sure there is no natural gas left inside the building.
- You or someone in the building may experience dizziness, headache, nausea, fatigue or flu-like symptoms. This could be a sign that a severe natural gas leak or more likely a release of carbon monoxide has occurred, which may be the result of an improperly adjusted natural gas appliance inside your home or workplace.

If you suspect a natural gas leak, **DO NOT** use a telephone or flashlight, switch a light on or off, light a match or create any other ignition source. Leaking natural gas can ignite, so you should immediately leave the house and go to a safe area where there is no indication of a natural gas leak. This may be a neighbor's house. **Call us at 1-502-589-5511 (outside Louisville 1-800-331-7370).** You should do the same thing if you suspect carbon monoxide is present in the home. Carbon monoxide detectors can be purchased from home improvement stores or from various online sources.

LG&E's Integrity Management Program

Safety is our priority at LG&E. For this reason, our lines are monitored and inspected so we can locate and fix potential problems before they occur. We also implement a pipeline integrity management program that includes identifying areas along our pipelines where the consequences of a failure would be significant, conducting inspections to verify the integrity of the pipeline, implementing pipeline safety communications plans, identifying pipeline risks and implementing measures to reduce pipeline risks.

Additional safety information, including emergency preparedness and land use practices is available on our website at www.lge-ku.com/rsc/lge/gas_safety.asp. You can also **call LG&E at (502) 589-5511 (outside Louisville 800-331-7370) for any natural gas concern or emergency. You can reach us 24 hours a day, 365 days a year.**



FSC
MIX
Label
FSC® C006437

Natural gas and pipeline safety: Be aware!

Our underground pipelines are the safest, most efficient way to deliver natural gas to your home. Underground gas pipelines can be hard to detect, and we sometimes mark pipelines with brightly colored sign posts in areas where pipelines may be more susceptible to damages. You may not even notice them, but it is important to remember precautions to keep our community safe.

Look for markers

Residential and commercial development in once rural areas is encroaching on pipeline rights-of-way (ROW) with increasing frequency. Encroachment implies safety concerns for local residents and for the physical integrity of the pipeline itself. To help prevent encroachment and excavation-related damage to pipelines, we install brightly-colored sign posts along the pipeline (ROW) to indicate the presence – **but not necessarily the exact location** – of underground pipelines. Markers come in a variety of shapes and sizes. They contain information about the nearby pipeline as well as **emergency contact information**.

Due to the safety needs surrounding pipelines, community and governmental decisions regarding land use may affect pipelines and public safety. Everything possible should be done to keep ROWs as free of physical encumbrances as possible in order to ensure reasonable and frequent visual inspections of the pipeline from the air and ground. In addition, a clear ROW helps ensure ease of access for repairs.

National Pipeline Mapping System

The National Pipeline Mapping System (NPMS) website at **www.npms.phmsa.dot.gov** enables users to view NPMS data one county at a time. NPMS data consists of gas transmission pipelines and hazardous liquid trunklines. It does not contain gathering or distribution pipelines, such as lines which deliver gas to an individual customer's home. Therefore, not all pipelines in an area will be visible in the public map viewer. **NPMS data is for reference purposes only. It should never be used as a substitute for contacting Kentucky 8-1-1 prior to excavating. Call 8-1-1 before you dig.**

Dig with care

Before doing any digging, everyone, including the general public, should ensure the locations of underground utilities in the area are marked. Call Kentucky 811 (dial 8-1-1). They will coordinate with Kentucky 811 member utilities in the area to have their underground lines marked free of charge to the caller.

The process to notify Kentucky 811 member utilities is designed to protect the public and the property. It requires that you:

1. **Call 8-1-1** at least two business days prior to excavation.
2. **Wait** until the lines have been marked before you begin digging.
3. **Respect the marks**.

If you see digging in an area where buried utility lines have not been located (paint on the ground or flags placed in the grass), protect yourself and your neighbors by reporting it immediately to us at 502-627-4427. Provide the address where the excavation is occurring and the name of the company or individual doing the excavating.

Leak Detection

LG&E performs regular leak surveys of its gas distribution system and a distinctive odor is added to the natural gas to aid in identifying gas leaks. Gas odor levels are monitored on a regular basis to ensure adequate levels of the odorant are present in the gas.

Although LG&E adds the odorant to natural gas to aid in the detection of leaks, you should not rely solely on your sense of smell to determine if there is a gas leak. Some persons may not be able to smell the odor because they have a diminished sense of smell or because the odor is being masked by other odors in the area. In addition, there may be rare conditions, such as odor fade (loss of odorant) which may occur and cause the odor to diminish so that it is not detectable.

Outdoors – If you live, work or play near a natural gas pipeline, the following signs may help you detect a leak on or near the pipeline right-of-way:

- You may **HEAR** a blowing or hissing sound.
- You may **SEE** dust blowing from a hole in the ground, continuous bubbling in one spot in wet or flooded areas, dead vegetation, abnormally dry or hardened soil or fire appearing as if it is coming from the ground or burning above the ground.
- You may **SMELL** a gaseous or hydrocarbon odor (similar to sulfur or rotten eggs).

If you suspect a gas leak outdoors:

1. Shut down and abandon any equipment being used in or near the area.
2. Avoid open flame and other sources of ignition. Do not start any motor vehicles or electrical equipment.
3. Evacuate the area and prevent unsuspecting people from entering.
4. Notify us at 1-502-589-5511 (1-800-331-7370) immediately so the leak can be verified and if necessary corrective action can take place.
5. Get help from local law enforcement officials to isolate the area.
6. Do not attempt to extinguish a natural gas fire. Request the local fire department to protect adjacent property.
7. Do not attempt to operate any pipeline valves.

Indoors – The following signs may help you detect a leak inside a building:

- You may **SMELL** a gaseous or hydrocarbon odor (similar to sulfur or rotten eggs). A faint odor of natural gas may mean that a pilot light has gone out on an appliance and should be re-lit or that there is some other leak or problem present. Open the doors and windows for ventilation. Don't try to re-light a gas furnace, water heater or range until you are sure there is no natural gas left inside the building.
- You or someone in the building may experience dizziness, headache, nausea, fatigue or flu-like symptoms. This could be a sign that a severe natural gas leak or more likely a release of carbon monoxide has occurred, which may be the result of an improperly adjusted natural gas appliance inside your home or workplace.

If you suspect a natural gas leak, **DO NOT** use a telephone or flashlight, switch a light on or off, light a match or create any other ignition source. Leaking natural gas can ignite, so you should immediately leave the house and go to a safe area where there is no indication of a natural gas leak. This may be a neighbor's house. **Call us at 1-502-589-5511 (outside Louisville 1-800-331-7370).** You should do the same thing if you suspect carbon monoxide is present in the home. Carbon monoxide detectors can be purchased from home improvement stores or from various online sources.

LG&E's Integrity Management Program

Safety is our priority at LG&E. For this reason, our lines are monitored and inspected so we can locate and fix potential problems before they occur. We also implement a pipeline integrity management program that includes identifying areas along our pipelines where the consequences of a failure would be significant, conducting inspections to verify the integrity of the pipeline, implementing pipeline safety communications plans, identifying pipeline risks and implementing measures to reduce pipeline risks.

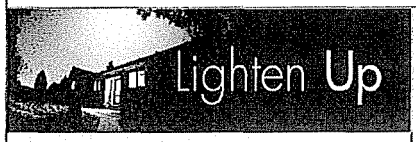
Additional safety information, including emergency preparedness and land use practices is available on our website at www.lge-ku.com/rsc/lge/gas_safety.asp. You can also **call LG&E at (502) 589-5511 (outside Louisville 800-331-7370) for any natural gas concern or emergency. You can reach us 24 hours a day, 365 days a year.**

LG&E KU an E·ON company

POWERSOURCE

Customers first. Energy that lasts.

May 2010



Lighten Up

Keep it cool this summer

Our A/C Testing Program identifies problems that may be keeping your air conditioning unit from operating at its peak efficiency, which can increase your energy costs, shorten the life of the unit, and make your home's temperature less than comfortable. For a discounted fee, a qualified technician will check for dirty air coils or improper refrigerant levels. If the technician finds these problems, you will receive a list of Dealer Referral Network contractors who can perform a tune-up at a discounted cost to ensure your system operates at optimum efficiency.

LG&E supplements both the Testing and Tune-Up fees in an effort to make the services more affordable for customers and to promote energy efficiency. This program is not designed to include or repair non-operational HVAC systems.

To learn more about our A/C Testing and Tune-Up Program and our other energy efficiency programs, visit **www.eon-us.com/ee** or call 1-800-356-5467.

Be a *Smart Saver*

ONLINE ENERGY AUDIT

Take ten minutes and save! Whether your home is large or small, there are cost-effective ways to reduce your energy usage. Our online residential energy audit will give you dozens of energy saving recommendations after assessing your home's energy use. Simply visit **www.eon-us.com/ee** to get started.

If you have already registered your account, log in then click "Programs," "Energy Efficiency," then "Home Energy Audit – Online."

Online outage map now available

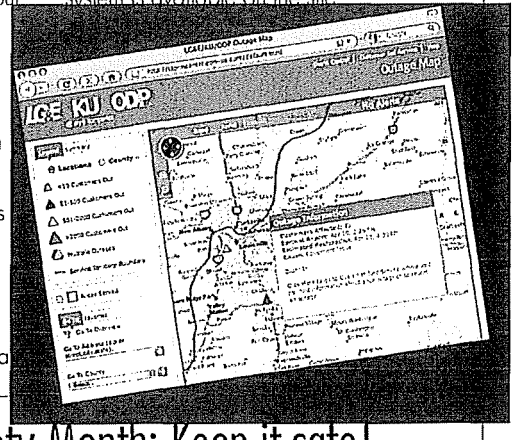
Outages across the LG&E service territories are now a permanent website feature. Near real-time information will be available on our website year-round.

"After the September 2008 wind storm and the January 2009 ice storm, we wanted to be proactive in enhancing communications and provide more timely information to our customers about outages," said Greg Thomas, vice president of Energy Delivery — Distribution Operations for E.ON U.S. "Now, customers have the most up-to-date information we have available on outages in their areas."

The map pulls data from the company's Outage Management System (OMS). These outage numbers appear on the map and in charts showing outages by county and by zip code. The site is updated automatically in regular interva

based on information available in OMS. Additionally, once operational staff have assessed the extent of an outage, estimated restoration times are provided on the map.

The online outage map can be accessed at **www.eon-us.com/storm**. A tutorial that offers quick tips on how to navigate the system is available on the site.



National Electrical Safety Month: Keep it safe!

53,000 electrical home structure fires
450 lives claimed
more than 4,000 people injured
$1.4 billion in property damage
3,300 extension cord fires

These annual statistics from the Electrical Safety Foundation International (ESFI) and the Consumer Product Safety Commission reflect the electrical safety hazards we face each day. Safety awareness is the best prevention of electrical injury and death. ESFI promotes this awareness by sponsoring National Electrical Safety Month. This year's campaign focuses on: renovating the right way; staying safe at work; educating your children; and electrical safety in the field. For more information and details, visit www.efsi.org.

Remember to follow these basic safety rules concerning you and electricity:

- **NEVER** touch anything electric, including light switches, if your hands are wet or you are standing on a wet surface.
- **NEVER** overload your power strips or surge protectors.
- **NEVER** place power cords or extension cords under doors, furniture or rugs, or near heat sources.
- **NEVER** use a frayed extension cord or an electrical device with a frayed cord.
- **ALWAYS** stay at least ten feet away from power lines.
- **ALWAYS** assume a downed line is a live power line and stay away. Keep others away and call us to report it. Call 911 if the situation is life-threatening.

Go to www.eon-us.com to learn more about electrical safety.

Understanding your bill

Your monthly bill includes a lot of useful information, such as how much energy your home is using, how your usage compares to the previous year, and how much carbon dioxide is being released into the air as a result of your energy consumption. Your bill is divided into these sections:

Account information lists your account number, name and address where you receive energy service.

Billing summary shows the amount of last month's bill, previous payment(s), current charges and total amount due.

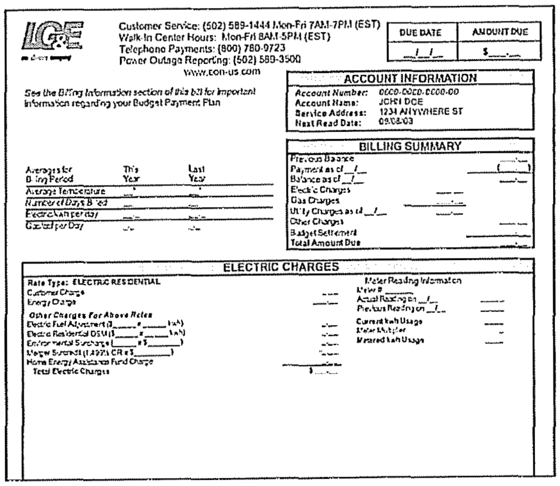
Averages for billing period offers a comparison to last year's bill, including the average daily temperature, amount of energy you used each day and the number of days billed in the billing period.

Electric charges summarizes your energy charge (rate multiplied by your usage) and additional adjustments related to the electricity you used.

Gas charges *summarizes your natural* gas costs multiplied by your usage and other adjustments related to your natural gas usage.

Important information on the back of your bill has your carbon footprint information, average carbon footprint, and tips for reducing your footprint.

Visit www.eon-us.com for additional information or contact one of our customer care representatives if you have any questions.



LG&E

Customer Service: (502) 589-1444 Mon-Fri 7AM-7PM (EST)
Walk-In Center Hours: Mon-Fri 8AM-5PM (EST)
Telephone Payments: (800) 780-9723
Power Outage Reporting: (502) 589-3500
www.eon-us.com

DUE DATE	AMOUNT DUE
__/__/__	$___.__

See the Billing Information section of this bill for important information regarding your Budget Payment Plan

ACCOUNT INFORMATION

Account Number:	0000-0000-0000-00
Account Name:	JOHN DOE
Service Address:	1234 ANYWHERE ST
Next Read Date:	09/08/03

Averages for Billing Period	This Year	Last Year
Average Temperature		
Number of Days Billed		
Electric kWh per day		
Gas Ccf per Day		

BILLING SUMMARY

Previous Balance
Payment as of __/__
Balance as of __/__
Electric Charges
Gas Charges
Utility Charges as of __/__
Other Charges
Budget Settlement
Total Amount Due

ELECTRIC CHARGES

Rate Type: ELECTRIC RESIDENTIAL
Customer Charge
Energy Charge
Other Charges For Above Rates
Electric Fuel Adjustment ($_____ x _____ kWh)
Electric Residential DSM ($_____ x _____ kWh)
Environmental Surcharge (_____ x $_____)
Merger Surcredit (1.497% CR x $_____)
Home Energy Assistance Fund Charge
Total Electric Charges $___.__

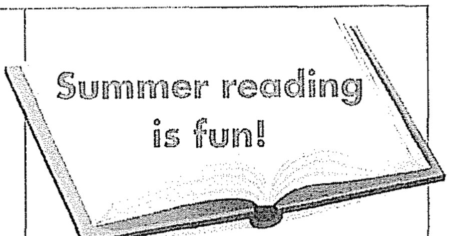
Meter Reading Information
Meter # _____
Actual Reading on __/__
Previous Reading on __/__
Current kWh Usage
Meter Multiplier
Metered kWh Usage

811 TO SAFETY!

Are you planning to build a deck, fence or home addition? Perhaps you plan to install a pool or plant trees or shrubs in your yard. If so, call Kentucky811 before beginning any excavation or digging work. Kentucky811 will notify the appropriate utilities to locate any underground lines to help prevent accidental line cuts and dig-ins that may cause an interruption in your service.

Before you begin any digging project, we ask that you:

1. Call 811 two business days before you start your project.
2. Wait the required amount of time for the underground lines to be marked. (You'll know they have been marked by the colored paint or flags in the ground.)
3. Respect the marks when doing your work.



Research shows that children who read during the summer perform better when they return to school in the fall. The Louisville Free Public Library and many other libraries throughout the LG&E service area offer summer reading programs. Get your child involved in a summer reading program today! Learn more by visiting your local branch.

Heather Metts, manager of Corporate Accounting, is extra busy in her spare time volunteering with the Girl Scouts, Boy Scouts, Junior Achievement and the Hydrocephalus Association. Heather joined the latter organization after her son was diagnosed with hydrocephalus, a disease which prohibits cerebral fluid in the brain from draining. For all four organizations, her volunteer duties range from organizing fundraising walks and teaching classes, to serving as treasurer and leading troops. "My husband says that I have Extreme Volunteer Disorder," she laughed. "I just can't help it. I get involved through my children and then I see an opportunity within the organization where I can make a positive impact, so I go for it."

Contact Information

www.twitter.com/eonus

Louisville Gas and Electric Company
Monday – Friday
7 a.m. – 7 p.m. (EST)
(502) 589-1444

Outside Louisville area
(800) 331-7370

For hearing/speech-impaired
Dial 711

24-hour Natural Gas Trouble/Emergencies
(502) 589-5511

24-hour Electric Trouble/Power Outages
(502) 589-3500

Customer Service walk-in center
701 South Ninth Street
Monday – Friday
8 a.m. – 5 p.m. (EST)

Business Service Center
Monday – Friday
7 a.m. – 6 p.m. (EST)
(502) 627-3313

Kentucky 811 - Locate Service
Dial 811

Outside Louisville area
(800) 331-7370

Visit our website
www.eon-us.com

Editor
Cheryl.Williams@eon-us.com

ENERGY STAR PARTNER

September 2010

LG&E POWERSOURCE

Customers first. Energy that lasts.

Energy fact...

September 2010

LG&E POWERSOURCE

Customers first. Energy that lasts.

Energy fact...

April 2011

LG&E POWERSOURCE

Customers first. Energy that lasts.

Right Tree, Right Place

Planting trees can help you save energy because the right tree in the right place will provide cooling shade in the summer and windbreaks in the winter. Consider these tips before you purchase and plant a tree:

- Trees cool your home by blocking sun and adding water to the air. Plant tall, wide-crowned deciduous trees where you want their shadow to fall during the hottest time of the year, such as the southeast and southwest walls of your home.
- Maples, oaks, spruces and pine trees are good choices for planting near your home to create shade and windbreaks.
- A dense planting of tall, leafy trees also will help control noise and dust.
- Don't plant larger trees where they can grow into utility lines. Short flowering trees, such as redbuds, dogwoods or crabapples, with a maximum height of 25 feet are a better choice.
- Low-branching evergreens planted on the north side of your home will help cut the chill of winter winds.
- Be sure to choose trees that are hardy for this area. In our region, that includes trees for zones 6 or 7.

View www.arborday.org – the website of the National Arbor Day Foundation to find the appropriate trees simply by entering your zip code.

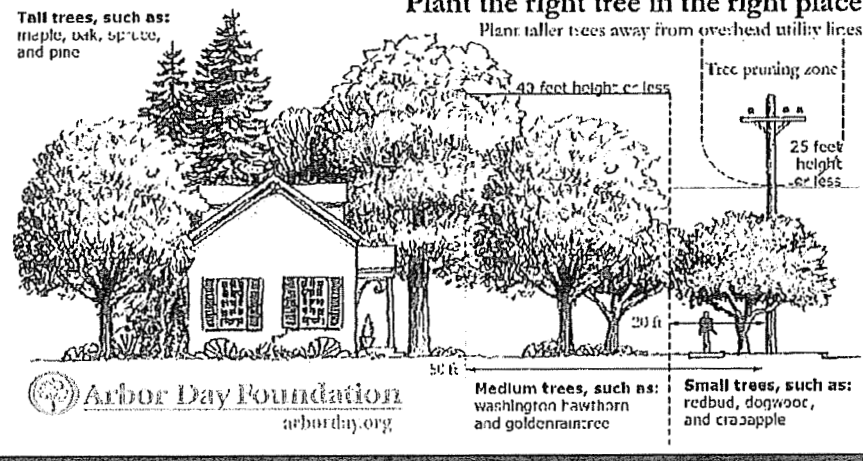
Recognizing tree hazards

Trees provide significant benefits to our homes and communities, but when they fall or interrupt critical electric service, they can become liabilities. Trees that are too close to power lines are directly responsible for the majority of the electrical power outages that occur on our system.

Our enhanced hazard tree program allows us to coordinate with local communities and property owners to evaluate and remove diseased and dying trees that pose a risk to electric service reliability ***beyond the rights-of-way***.

While it is the ultimate responsibility of the property owner to provide for the safety of trees on their property, evaluating the seriousness of some of the common defects is best done by a professional arborist. When it is determined a particular tree poses a risk to electric service reliability, our certified arborists can help you determine if the best course of action is to remove the tree.

We recognize that trees are an asset to your home and our communities. Let's work together to ensure you continue to enjoy the beauty and comfort of the trees around your home while also ensuring you continue to receive the safe, reliable electric service you deserve.



Technotes

Celebrate Earth Day by going paperless

Looking for an easy way to make a difference this Earth Day? Enroll in paperless billing. With just a few minutes of your time today, you'll be making an environmental difference that will last a lifetime.

The average American family throws away more than 2,000 pounds of paper each year. That's equal to 17 trees. Just think of the difference you can make when you switch to paperless billing.

As a paperless billing customer, you'll receive an email each month when your bill is ready. The email includes the amount due, payment due date and a link to our secure site. Log in to view your bill. You can even pay it online.

Act now to receive an extra benefit. For every paperless billing enrollment received before April 30, we'll donate $1 to our "Plant for the Planet" tree planting program.

Signing up is easy, and it doesn't cost you a thing. But the benefits are many. Visit lge-ku.com.

BEFORE YOU DIG

Spring is the ideal time for home improvements. Whether you're building a deck or planting a tree, be sure to call 8-1-1 at least two business days before you dig. Kentucky811 will work with utility companies in your area to have underground lines marked at no cost to you. This will ensure you can perform your work safely by respecting the marks and digging with care.

Stay safe and spring into action this season

Spring is the time of year to prepare for stormy weather. Be sure to follow these important safety tips:

- Consider all fallen power lines energized. Stay away and keep others away, too.
- Stay away from all water-soaked areas that have electrical equipment nearby.
- Don't touch metal fences or guard rails during or after a storm. If a downed power line is touching the fence or rail, it may be electrified even when there is some distance between the line and fence or rail.
- Keep a battery-powered radio and flashlight handy with extra batteries.
- Call us immediately at 502-589-1444 (outside Louisville 1-800-331-7370) if you see a downed power line.

More convenience with phone payments

If you prefer to pay your LG&E bill over the phone, you can call our Customer Service Department at (502) 589-1444 or 1-800-331-7370 outside the Louisville area. When you press 1-2-2-3, our automated system will connect you directly to the third-party vendor who processes telephone payments for us. Our vendor charges $2.95 to process payments made by check, PayPal, debit and Visa, Mastercard and Discover. You can make your payment safely and securely 24 hours a day.

Eco-Centric

Build your new home with savings in mind

Congratulations on your decision to build a new home! Consider building an ENERGY STAR® certified home, which uses substantially less energy for heating, cooling and water heating. Annual savings can range from $200 to $400, resulting in thousands of dollars in savings over the life of your home. And you will reduce your greenhouse gas emissions through increased energy efficiency.

Builders who have achieved the ENERGY STAR rating are able to construct your new home with energy efficient materials and construction methods. Finding a builder who is actively building ENERGY STAR homes in your area is as easy as visiting lge-ku.com/build.

Recently, LG&E awarded their Kentucky Home Performance Program Awards to builders who were able to best maximize the energy efficiency rating of the homes they built. The recipients are:

Best Scoring Home
Rater Partner – Shawn Purcell
Customer Builder – Kimbel Construction
Customer Builder – Mike Oney Builders
Production Builder – Dominion Homes

Best Scoring Building
Multifamily Building Partner – HPI

Plaque Winners: Most Homes Exceeding Code+25% Efficiency
Rater Partner, Single & Multi-Single Family – Shawn Purcell
Rater Partner, Multifamily – Chris Zitelli
Builder Partner, Single & Multi-Single Family – Monsour Builders
Builder Partner, Multifamily – HPI Construction

Exploring the open road to electric vehicles

The concept of electric vehicles may seem new to many people, but did you know the first electric vehicle was built in 1830? In 1900, nearly 40 percent of all vehicles were powered by electricity, a trend that continued for 20 years. That's when production of electric vehicles stopped. While the electric vehicle isn't new by any means, there is certainly a renewed interest among consumers, the auto industry and, as you can imagine, the electric utility industry.

We, at LG&E, have actively followed the movement, and we've celebrated as each of the top vehicle manufacturers announced plans to make an electric model available to consumers.

In August 2010, we announced a Low-Emission Vehicle Service Rate, which is being offered as a three-year pilot to residential customers. It includes battery electric or plug-in hybrid vehicles recharged through a charging outlet, as well as natural gas vehicles refueled through an electric-powered refueling appliance at your home. Find out more about our commitment to helping speed the introduction and widespread adoption of plug-in electric vehicles at lge-ku.com.

Contact Information

www. twitter.com/lgeku

Louisville Gas and Electric Company
Monday – Friday
7 a.m. – 7 p.m. (Eastern Time)
(502) 589-1444

Outside Louisville area
(800) 331-7370

For hearing/speech-impaired
Dial 711

24-hour Natural Gas Trouble/Emergencies
(502) 589-5511

24-hour Electric Trouble/Power Outages
(502) 589-3500

Customer Service walk-in center
701 South Ninth Street
Monday – Friday
8 a.m. – 5 p.m. (Eastern Time)

Business Service Center
Monday – Friday
7 a.m. – 6 p.m. (Eastern Time)
(502) 627-3813

Kentucky 811 - Locate Service
Dial 811

Outside Louisville area
(800) 331-7370

Visit our website
www.lge-ku.com

Editor
Cheryl.Williams@lge-ku.com

ENERGY STAR PARTNER

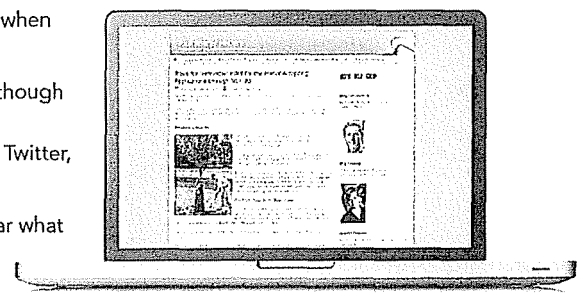
LG&E POWER SOURCE DECEMBER 2011

PUT YOUR ENERGY INTO IT.

Share ideas, discuss important topics and comment on current issues when you participate in our blog, Your Energy Matters.

There's a lot to talk about out there in the world of energy. So, even though we've been communicating with you for years, through newsletters, advertising, community outreach, e-mail and, more recently, through Twitter, we feel blogging is another great way to reach you.

We're posting stories about issues that affect you, and we want to hear what you have to say. So start blogging, and be heard. Visit lge-ku.com and get your blog on with LG&E.



DON'T LET YOUR MONEY GO UP IN SMOKE.

You may think that burning a fire in the fireplace or wood stove will reduce your heating bills, but, in fact, these appliances can actually suck the heated air out of your living room and increase the amount of energy you use to heat your home.

Follow these tips to control your costs when using these methods of heating.

- When a fireplace is in use, close off the room. Be sure to crack the window an inch and turn down the thermostat so it doesn't have to work harder to maintain the temperature.
- Install a fireplace insert certified by the Environmental Protection Agency (EPA). This will blow heat from the fire into the room, let the wood burn more completely and limit the amount of heat lost up the chimney.
- When you aren't burning a fire, keep the damper closed to keep heat from disappearing up the chimney.
- Use a glass screen or convective grate with an open masonry fireplace to reduce warm air loss and improve heat recovery.

SUPER SAFETY TIP: This winter, protect your home and your family from fire hazards by following these fire safety rules. Keep a fire extinguisher near all fireplaces and wood stoves. Keep flammables such as curtains, books and newspapers far away from flames. Keep the doors of a wood stove closed unless you're loading it or stoking a fire. NEVER leave a fire unattended.

KEEP OLD MAN WINTER KNOCKING THIS WINTER.

Save money and stay warm this winter by following these simple recommendations for saving energy:

1. Hot and Cold – Energy-efficient equipment that is sized and installed correctly, with properly sealed ducts, can save you as much as 20 percent on your annual energy costs.

2. Keep it Clean - Check the filter in your heating and cooling system monthly. Clean or change it as needed. Have your heating equipment checked at the start of each winter to make sure it's operating efficiently and safely.

3. Bundle up Your Home – Seal the gaps and cracks in your home – most often found along outer walls, ceiling, windows and floors. Don't forget to seal or insulate the switch plate and socket covers that are located on your outer walls. Pay special attention to your attic and basement where the biggest gaps and cracks are often found.

4. Tighten Your Ducts - If you have a forced-air furnace or heat pump, a duct system circulates warm air throughout your home. Leaky ducts can reduce your system's overall efficiency by as much as 20 percent. Seal your ducts to save on your energy bills and consistently heat every room in your house.

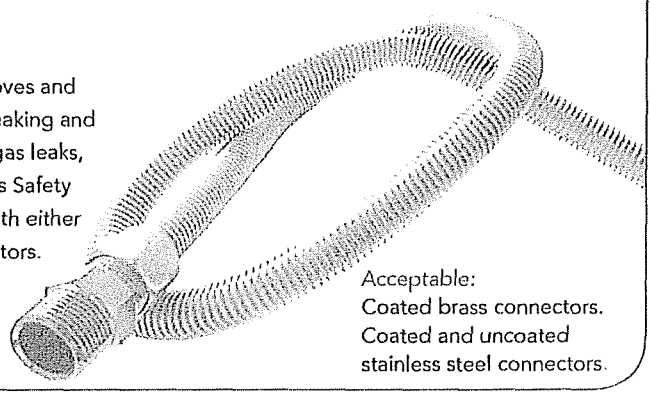
Visit our website at lge-ku.com for additional tips on keeping warm and saving money this winter.

BEWARE BAD HOOKUPS.

There are better ways to connect.

Uncoated brass flexible connectors, like those used to connect stoves and dryers (installed before 1977) to gas-supply pipes are prone to breaking and deterioration. Over time, the end pieces can separate and cause gas leaks, leading to property damage or injury. The U.S. Consumer Products Safety Commission recommends replacing uncoated brass connectors with either new plastic-coated brass connectors or new stainless-steel connectors.

To have your connectors inspected or replaced, contact a licensed plumber or professional appliance-repair service.



Acceptable:
Coated brass connectors.
Coated and uncoated stainless steel connectors.

RESOLVE TO BE MORE ENERGY EFFICIENT IN 2012.

If your list of resolutions includes finding ways to save energy and money, we can help. Our list of energy efficiency programs is going to be bigger and better than ever. In 2012, you will be able to take advantage of three new and four enhanced energy efficiency programs, including:

1. Residential Incentives - Customers who install ENERGY STAR® appliances, energy-efficient HVAC equipment or window film to their homes will be eligible to receive rebates of $50 to $300.
2. Residential Refrigerator Removal Program - LG&E will pay you $30 to remove and recycle working secondary refrigerators and freezers.
3. A Smart Energy Profile: A select group of customers will receive a report from LG&E that compares their energy use to similar customers. The report also includes details about energy efficiency programs that are available.

In addition to the new programs, we are expanding four of our existing programs: Demand Conservation, Commercial Energy Rebates, Residential Audit and WeCare. Be sure to visit us online at lge-ku.com.

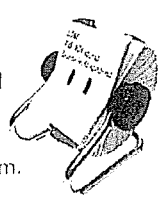
We are excited about the PSC's approval, and look forward to helping you find even more ways to save. We are finalizing contracts and administrative details and hope to make the new and enhanced programs available in the next couple of months. Watch for information in future Power Source newsletters or visit our energy efficiency site at lge-ku.com.

UPDATE YOUR ROLODEX.

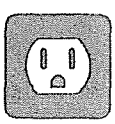
We have completed the transition to our new payment processing facility in Louisville. If you mail your payment, please update your records to reflect the new address:

LG&E
P.O. Box 9001960
Louisville, KY 40290-1960

Looking for ways to save paper and postage? Consider online billing and payment. Sign in or register your account today at my.lge-ku.com.



Contact Information



BY PHONE

Louisville Gas and Electric Company
Monday – Friday
7 a.m. – 7 p.m. (Eastern Time)
(502) 589-1444

Outside Louisville Area
(800) 331-7370

For Hearing/Speech-Impaired
Dial 711

24-Hour Natural Gas Trouble/Emergencies
(502) 589-5511

24-Hour Electric Trouble/Power Outages
(502) 589-3500

Business Service Center
Monday – Friday
7 a.m. – 6 p.m. (Eastern Time)
(502) 627-3313

IN PERSON

Customer Service Walk-In Center
701 South Ninth Street
Monday – Friday
8 a.m. – 5 p.m. (Eastern Time)

Kentucky 811 – Locate Service
Dial 811

Editor
Cheryl.Williams@lge-ku.com

Visit our Website:
www.lge-ku.com

ENERGY STAR PARTNER

Check out our blog – Your Energy Matters – at lge-ku.com. And follow us on twitter www.twitter.com/lgeku

Operation and Maintenance Manual

Emergency Manual

Operator Qualification Course

Title and Training Materials

Regarding Outside Odor Complaints

and Leak Investigations

Abnormal Operating Conditions 2011

(Including Leak Investigation)

OQ/M7

Recognize and React to Abnormal Operating Conditions

Name _____

Employee Number _____

1. The approximate Lower Explosive Limit (LEL) of natural gas is.

   (a.) 2%
   (b.) 5%
   (c.) 7%
   (d.) 15%

2. The approximate Upper Explosive Limit (UEL) of natural gas is.

   (a.) 10%
   (b.) 15%
   (c.) 20%
   (d.) 25%

3. When things go wrong on a natural gas emergency is usually because of_____.

   (a.) Complacency
   (b.) Tunnel vision
   (c.) Shortcuts
   (d.) Lack of training and experience
   (e.) All the above

4. The weight of natural gas when compared to air is _____.

   (a.) .42
   (b.) .64
   (c.) 1.2
   (d.) 1.5

5. Natural gas is toxic.

   (a.) True
   (b.) False

6. What can indicate an overpressure condition?

   (a.) Odor of gas
   (b.) Open relief valve
   (c.) Pilot lights going out
   (d.) All the above

7. If an AOC presents and immediate danger you must _____.

   (a.) Make repairs if possible
   (b.) Replace component(s) at the time of discovery
   (c.) Implement emergency response procedures and make notification
   (d.) All the above

8. Things to consider when evaluating a natural gas leak are_____.

   (a.) Where is the gas
   (b.) How much is there
   (c.) The extent of the leak
   (d.) Location to other structures
   (e.) All the above

9. The main priority when investigating a natural gas leak is _____.

   (a.) Asking people questions
   (b.) Staying focused
   (c.) Public safety
   (d.) Finding the leak and fixing it

10. One factor that influences a leakage pattern is _____.

   (a.) Pressure and leak size
   (b.) Ground cover and frost
   (c.) Other utilities
   (d.) Water and soil type
   (e.) All the above

11. The most import action to take when investigating a natural gas is leak is to _____.

   (a.) Evacuate
   (b.) Establish a perimeter
   (c.) Position a manned fire extinguisher
   (d.) Park equipment upwind

12. A leak which is recognized as non-hazard at the time of detection, but which justifies scheduled repair based on probable future hazard is classified as a _____ leak.

(a.) Class 1
(b.) Class 2
(c.) Class 3

13. A leak which is non-hazard at the time of detection, and can be reasonably expected to remain non-hazardous is classified as a _____ leak.

(a.) Class 1
(b.) Class 2
(c.) Class 3

14. A leak which represents an existing probable hazard to person or property and which requires immediate repair or continuous action until the condition no longer is hazardous is classified as a _____ leak.

(a.) Class 1
(b.) Class 2
(c.) Class 3

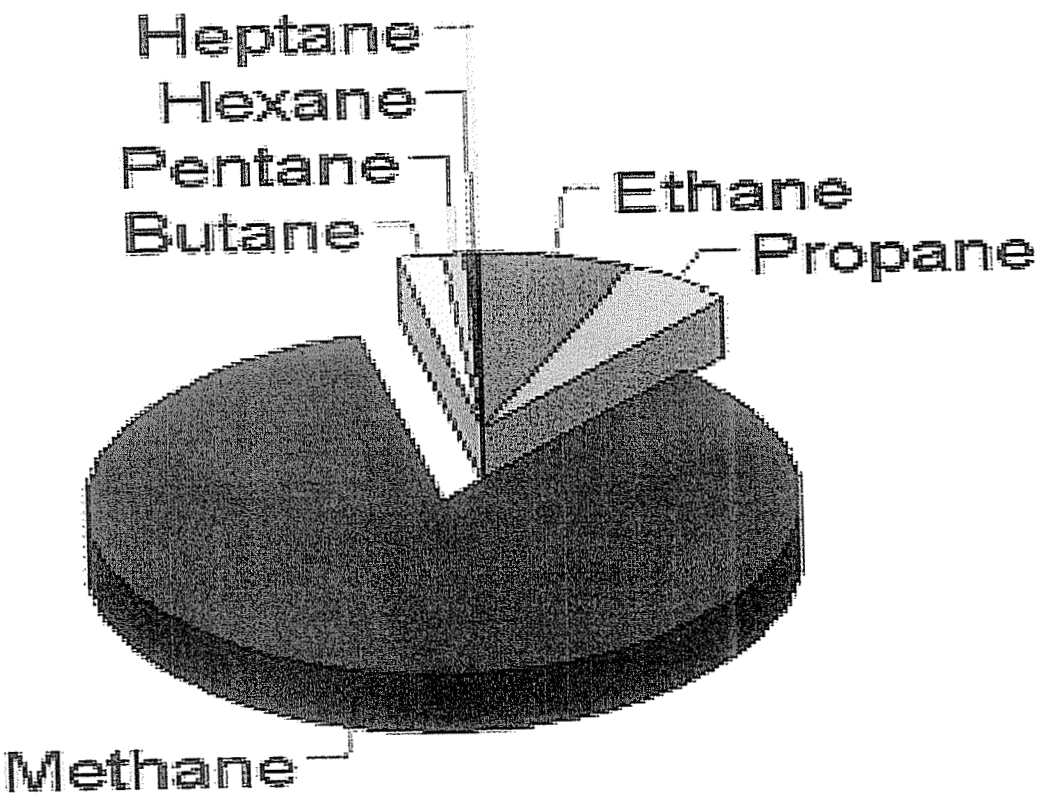
15. The instrument which is used to classify leaks is the _____.

(a.) Dip needle
(b.) Combustible Gas Indicator
(c.) Hydrogen Flame Ionization Unit

OQ M-7
2011

Recognize and React to Abnormal Operating Conditions

Natural Gas Make-up



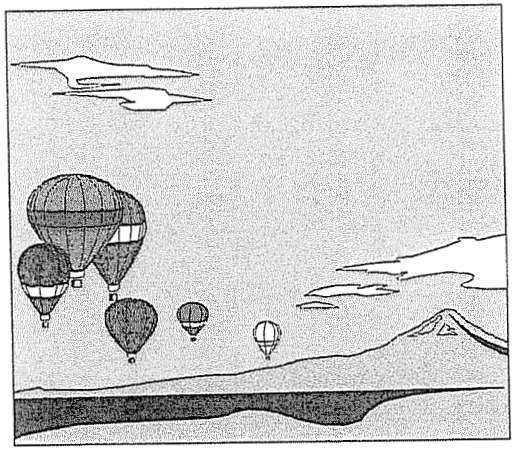
Odor

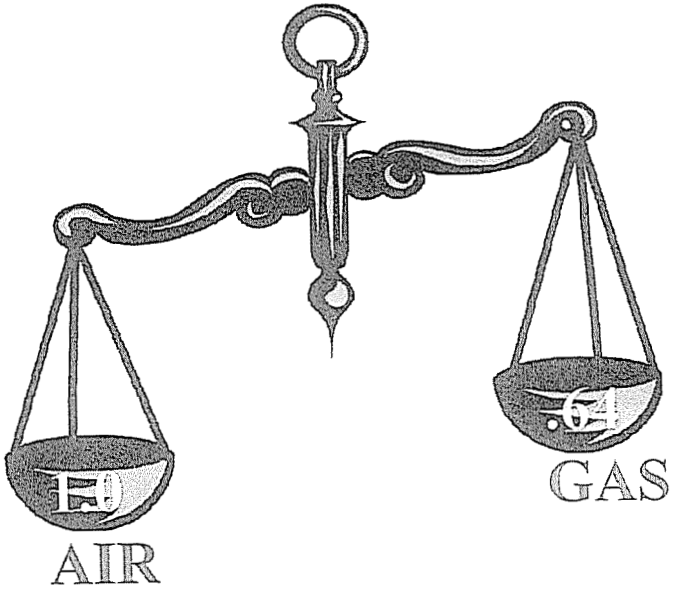
has no odor
to aid in the
detection of gas leaks

"ODORANTS" are added
They have little or no
effect on the
combustion of gas

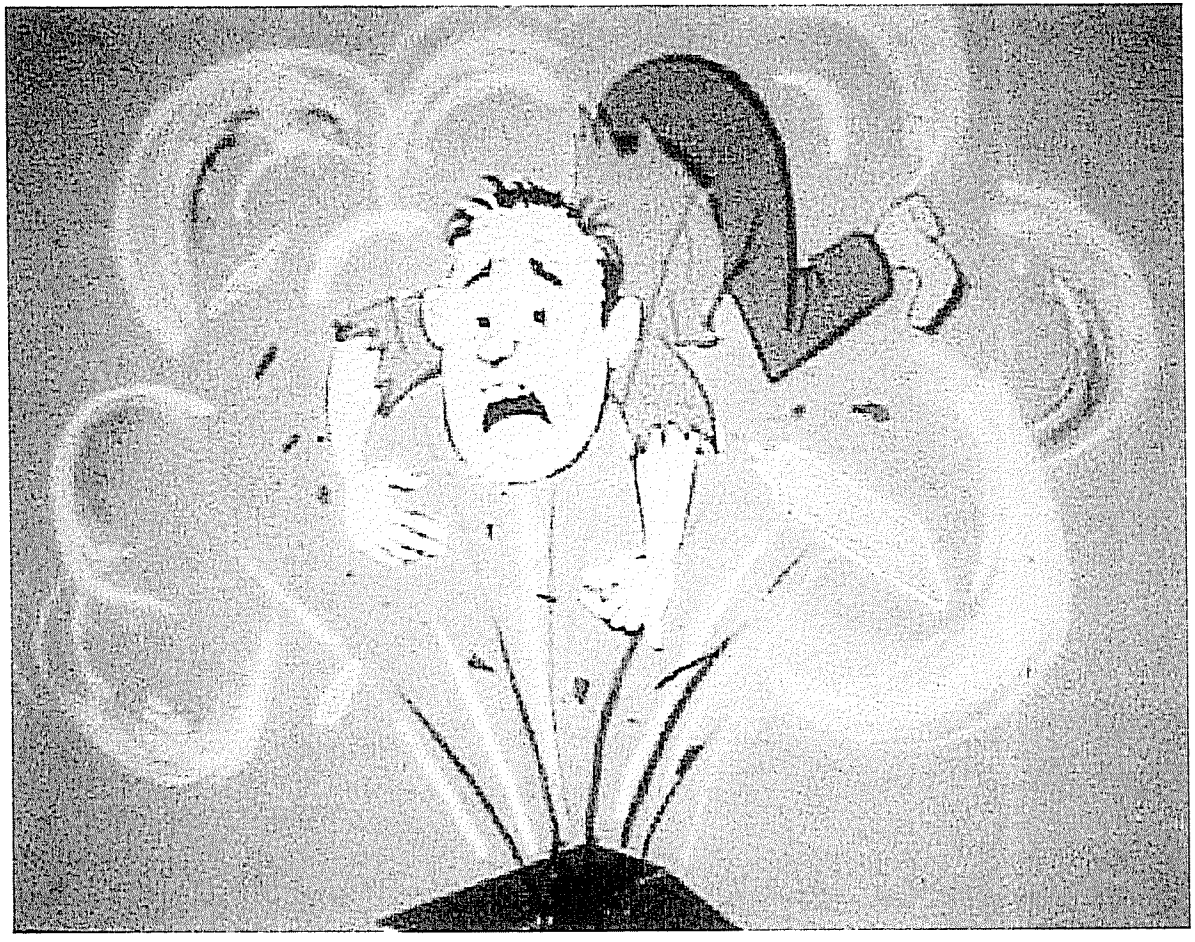
Specific Gravity

GAS IS LIGHTER THAN AIR SO IT WILL RISE AND DISSIPATE INTO THE ATMOSPHERE

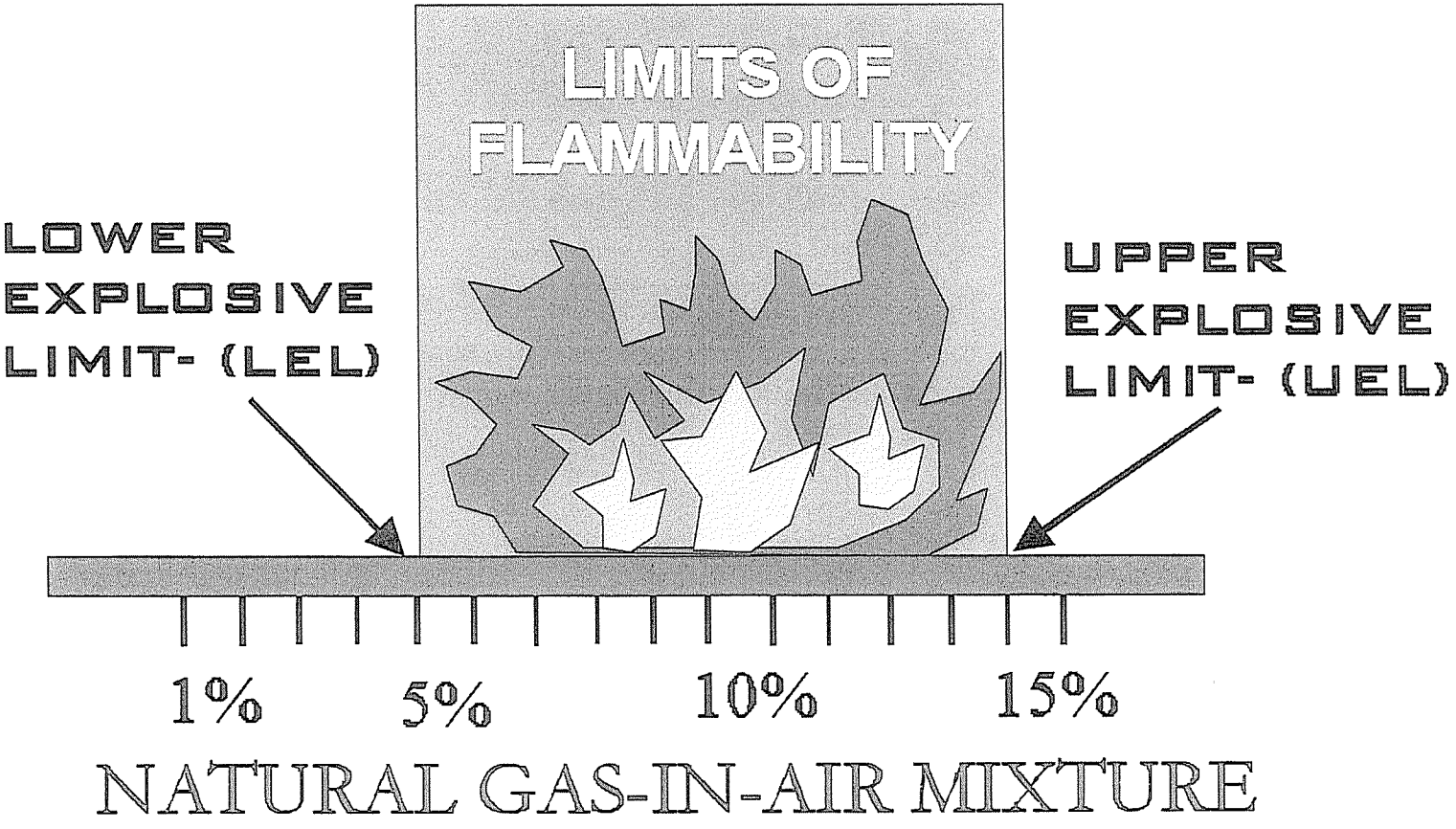


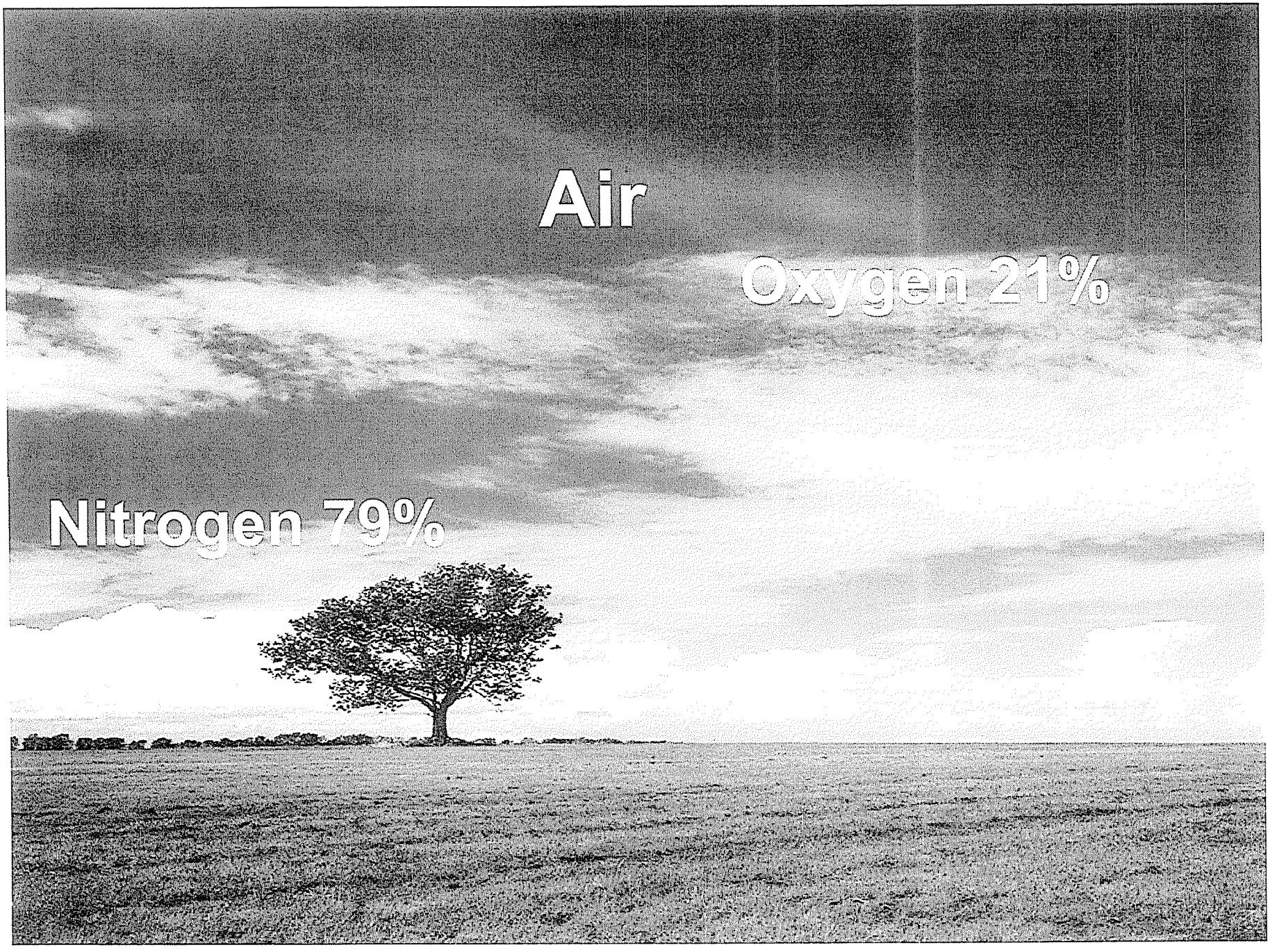


Natural Gas is Explosive

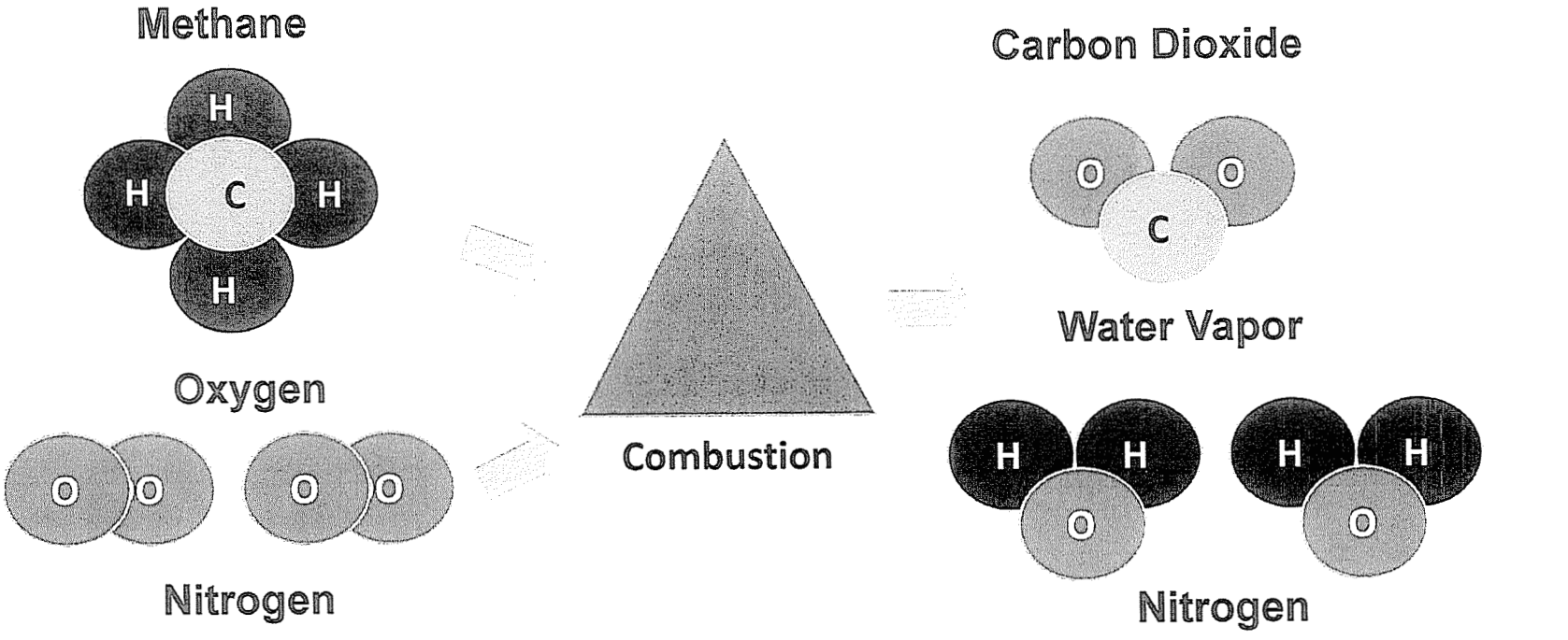


Flammability Limits

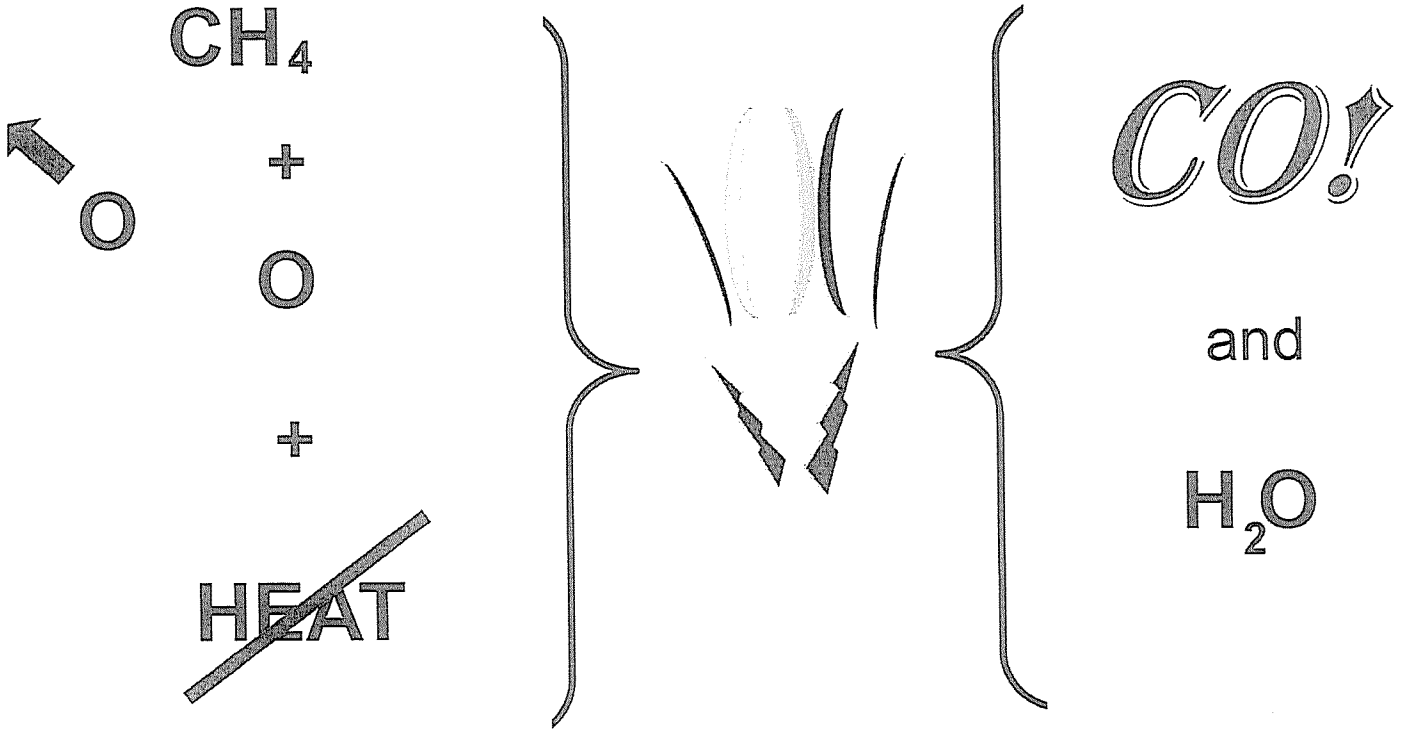



Air
Oxygen 21%
Nitrogen 79%

Combustion of Gas –In Air



Carbon Monoxide



INCOMPLETE COMBUSTION

Ignition Temperature

TYPE OF GASES	IGNITION TEMPERATURE
ACETYLENE	580° F
AMMONIA	1200° F
GASOLINE	800° F
NATURAL GAS	1100° F
PROPANE	900° F

Heating Value

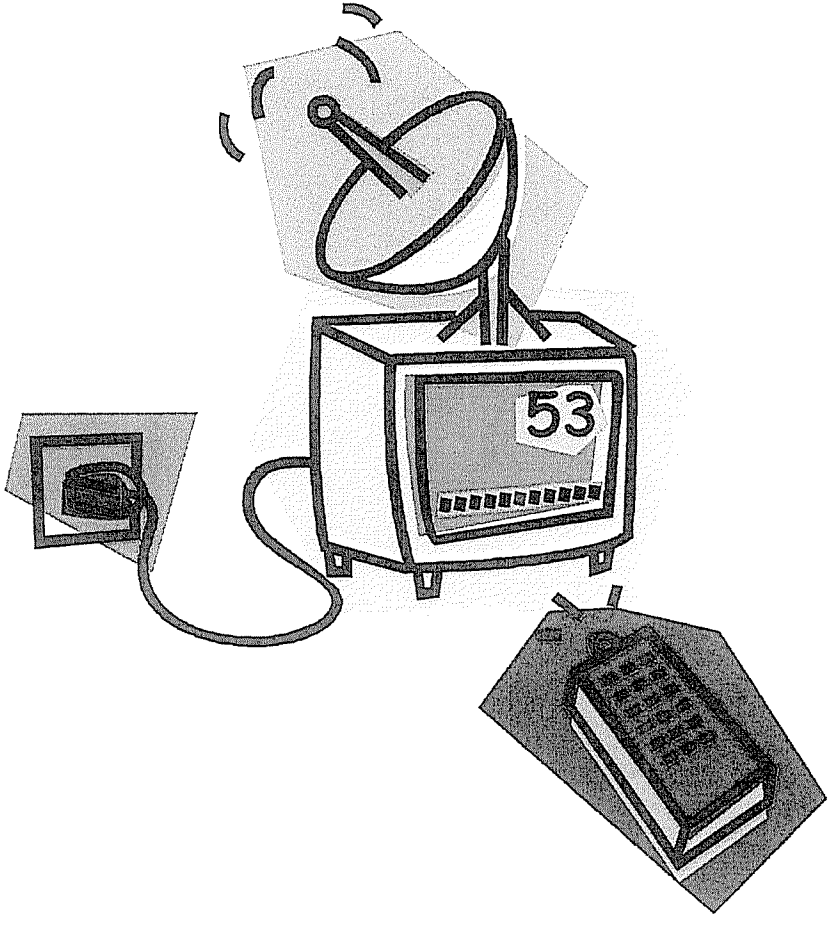
BTU = BRITISH THERMAL UNIT

ONE BTU = THE AMOUNT OF HEAT REQUIRED TO RAISE THE TEMPERATURE OF ONE POUND (1 PINT) OF WATER 1° F

NATURAL GAS = 1,000 BTU PER CUBIC FOOT

PROPANE = 2,500 BTU PER CUBIC FOOT

Anatomy Of A Gas Leak
A Collaborative Approach



Where Things Go Wrong

- Complacency
  - "We've done this job dozens of times"
- Tunnel Vision
  - Not focusing on the overall picture
- Shortcuts
  - Not following the approved procedures
- Lack of training/experience
  - Have never experienced this situation

What Affects Gas Migration

- Depth
- Pressure
- Soil
- Ground cover
- Soil type
- Water
- Voids
- Leak
- Size
- Frost
- Other utilities

Abnormal Operating Condition

- CFR 49, Part 192.803 states the following definitions – abnormal operating conditions means a condition identified by the operator that may indicate a malfunction of a component or deviation from normal conditions that may:
  - Indicate a condition exceeding design limits, or
  - Result in a hazard(s) to persons, property, or the environment

AOC Examples

- Unplanned escape of gas from a pipeline
- Fire involving a pipeline facility
- Explosion involving a pipeline
- Overpressure in a pipeline
  - Relief valve open
  - Telemetry pressures readings
- Underpressure in a pipeline
- No pressure in a pipeline that was last known to be in service
- Pipeline facility installation that no longer meets code requirements and/or company policy

Actions to Take

- Evacuate occupants from the affected area
- Move occupants and bystanders away from area
- Establish and monitor the perimeter of the gas leak
- Eliminate ignition sources
- If gas is detected in the ground, **establish the perimeter** of the leakage area
- Park motorized vehicles safe distance, upwind
- Get help as soon as possible
- Notify others affected by the emergency
- Control escaping gas
- Ventilate building affected
- Leakage outside may require purging or venting
- Position fire extinguisher upwind
- Large volume make sure proper equipment is available

Reacting to AOC's

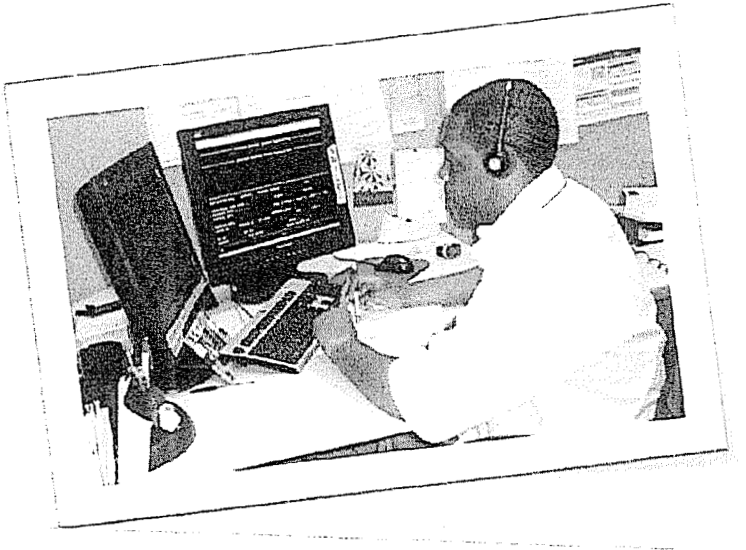
- If the AOC presents an immediate hazard
  - Make repairs if possible
  - Replace component(s) at the time of discovery
  - Implement emergency response procedures and make notification
- If the AOC does not pose and immediate hazard
  - Initiate the appropriate action that will ensure a timely repair
  - Analyze and treat it as if it were a Grade 2 or Grade 3 leak

Odor Complaints

- Odor complaints investigations begin with a call

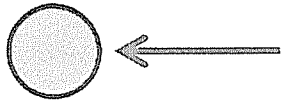
The Key Is Listening

- Not every call is a gas emergency, however, calls involving an odor complaint should be considered an emergency
- Listen to the customer and ask questions in order to gather information needed

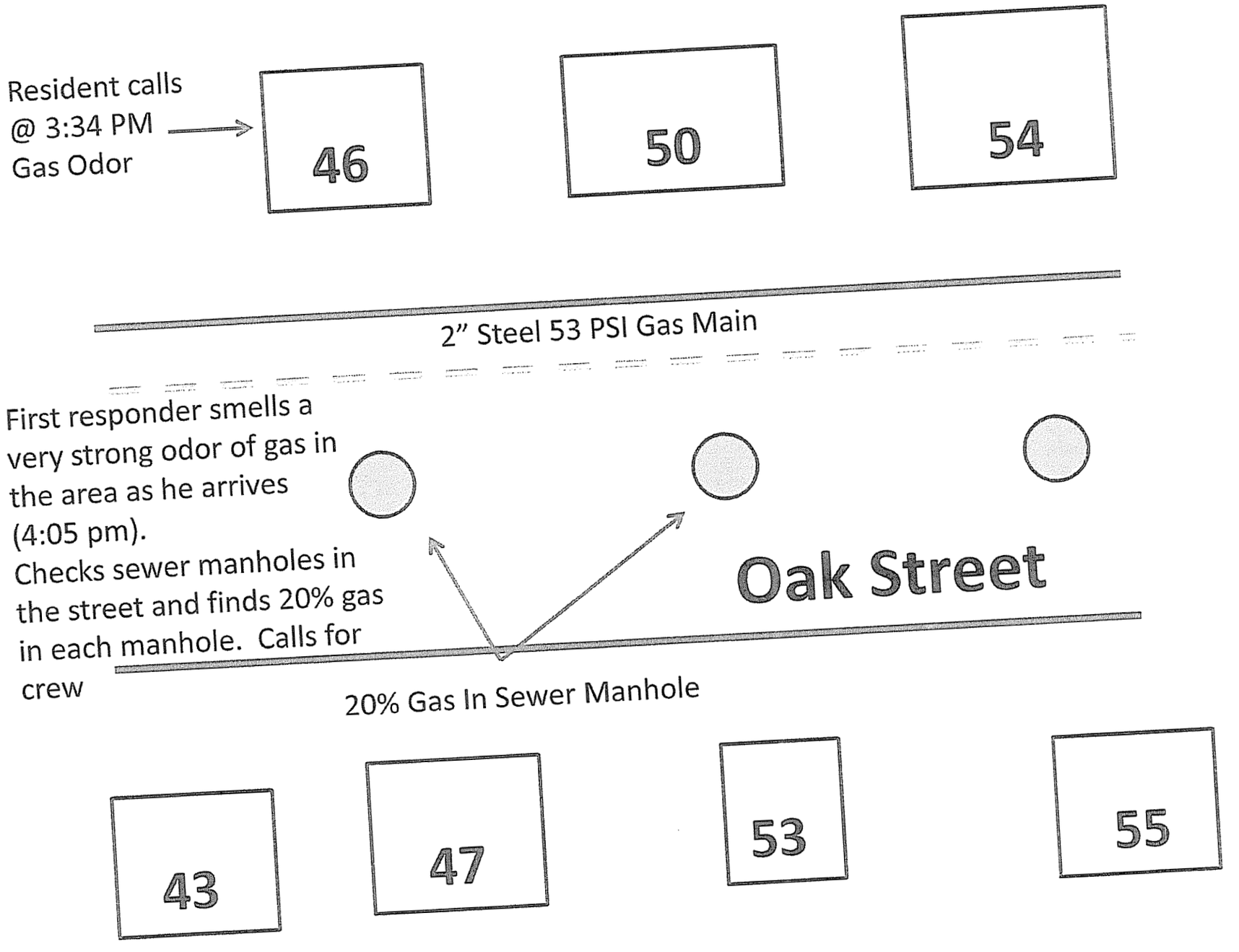


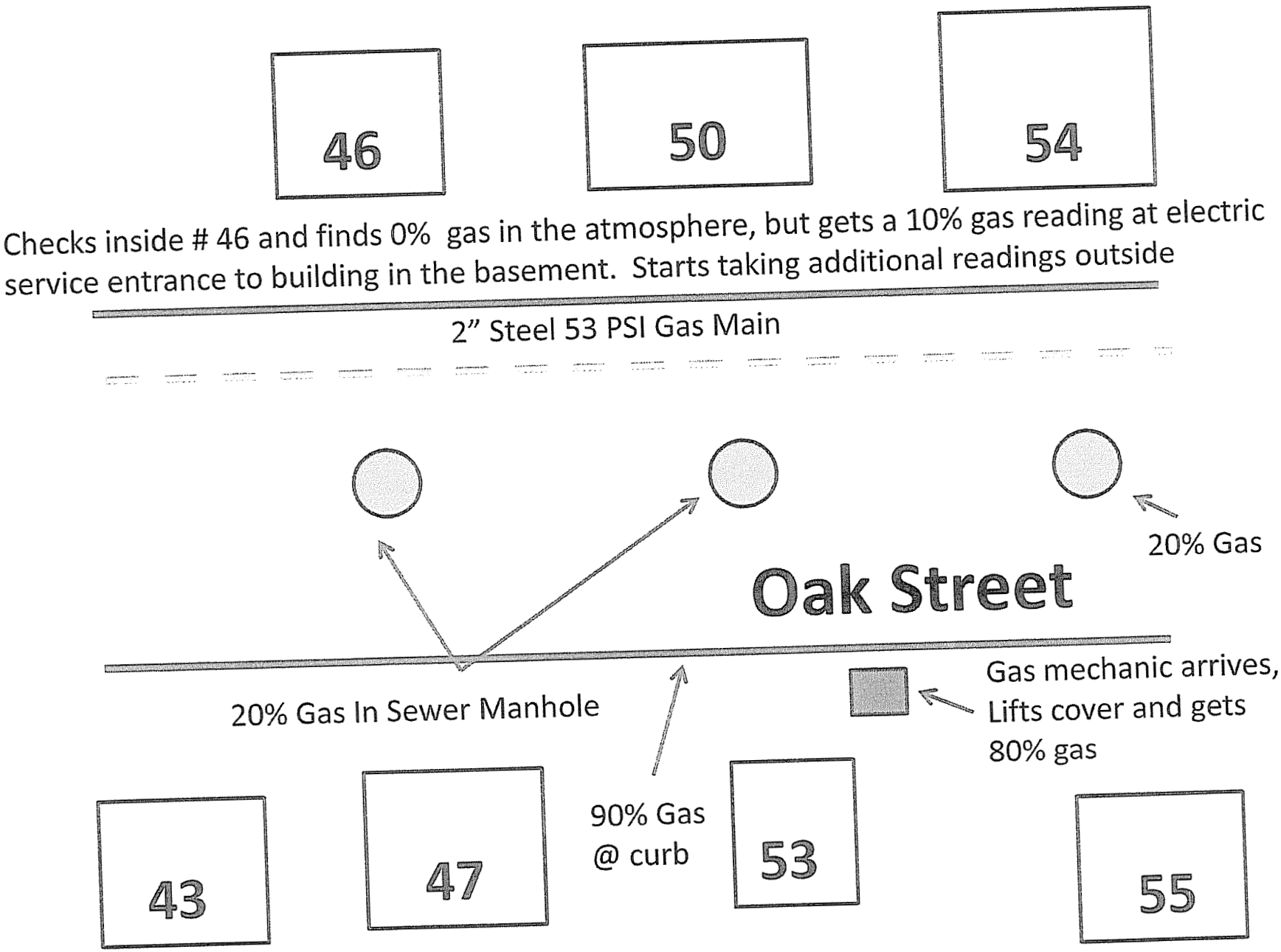
2" Steel 53 PSI Gas Main

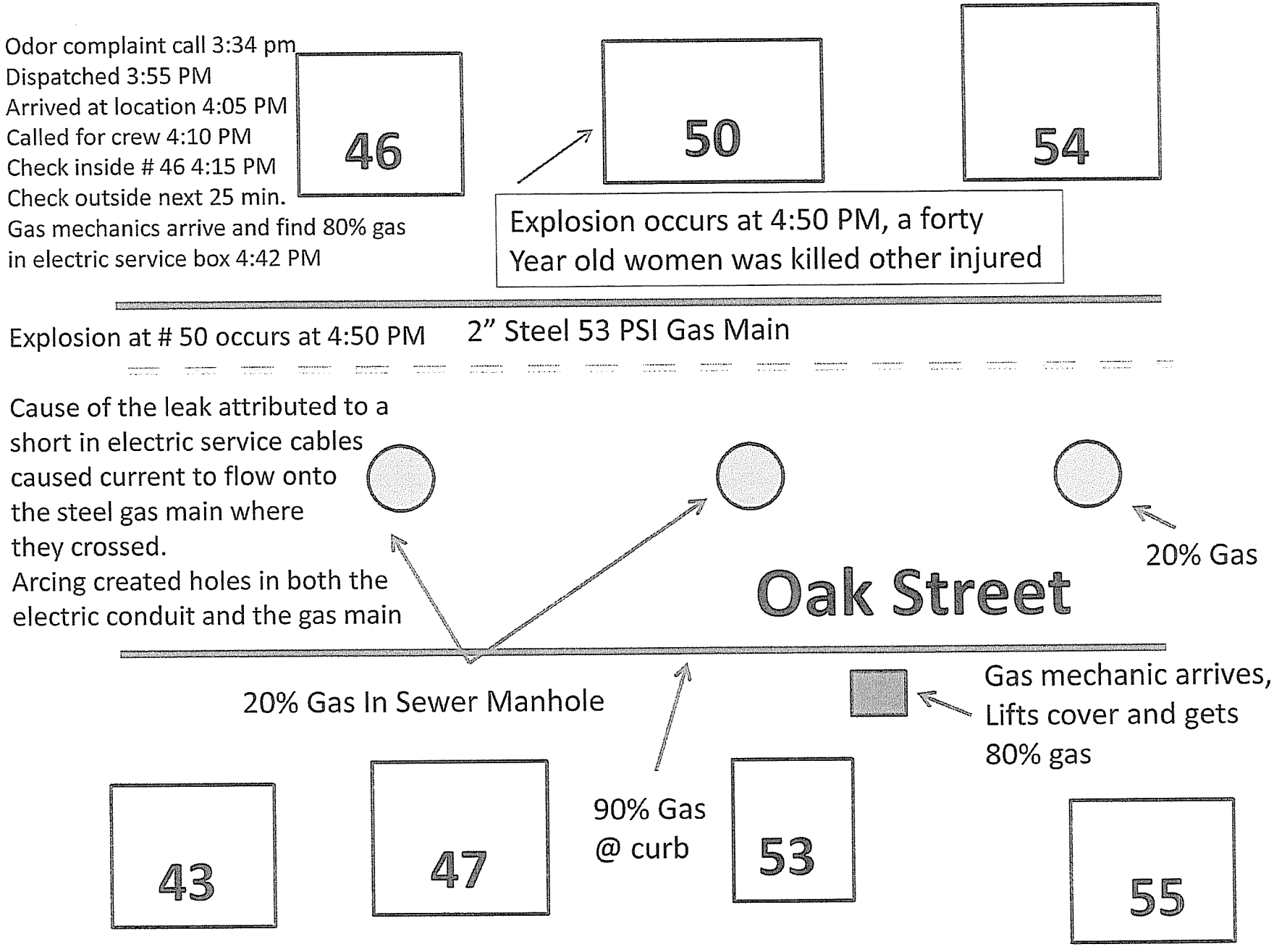
Oak Street

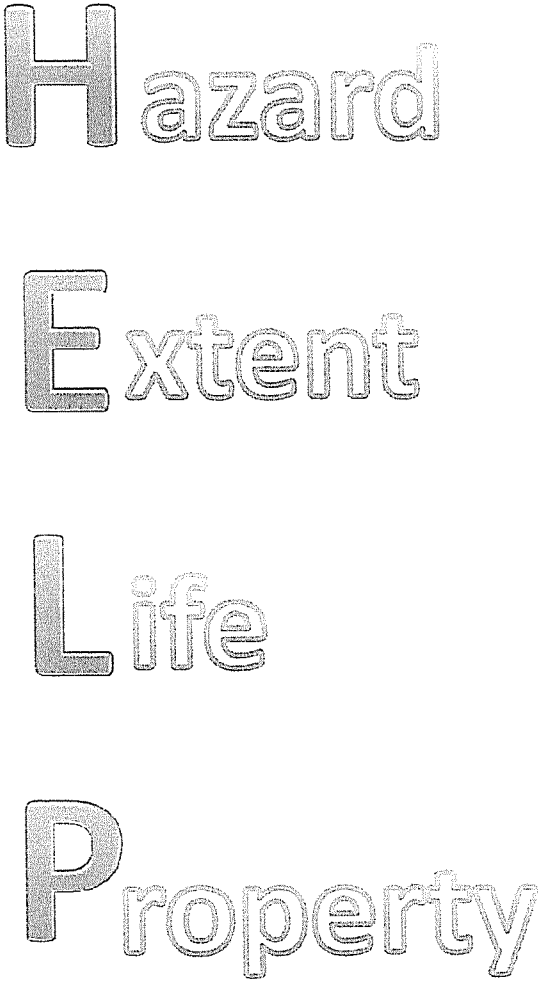


20% Gas In Sewer Manhole

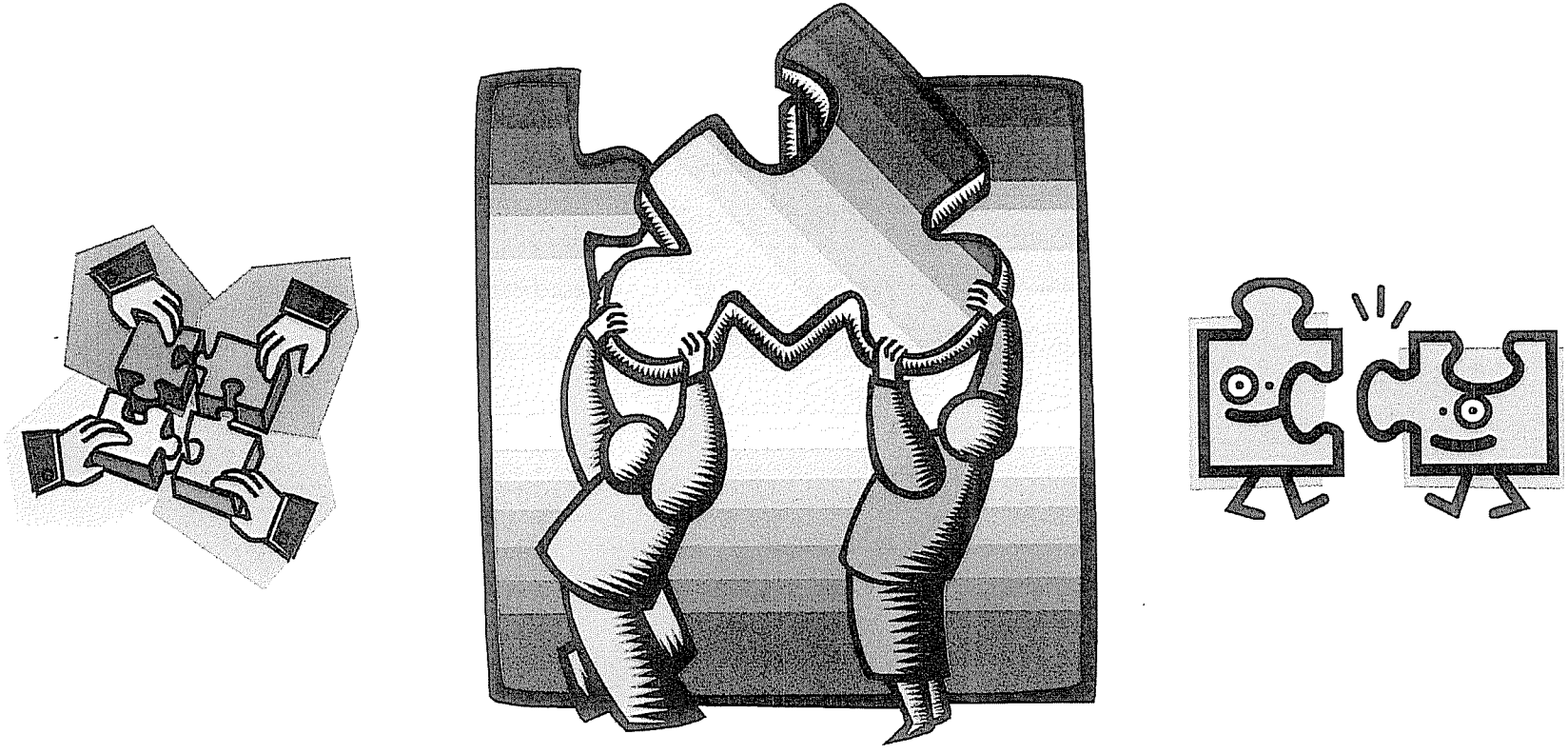

Resident calls
@ 3:34 PM
Gas Odor
46
50
54
2" Steel 53 PSI Gas Main
First responder smells a very strong odor of gas in the area as he arrives (4:05 pm).
Checks sewer manholes in the street and finds 20% gas in each manhole. Calls for crew
Oak Street
20% Gas In Sewer Manhole
43
47
53
55


46
50
54
Checks inside # 46 and finds 0% gas in the atmosphere, but gets a 10% gas reading at electric service entrance to building in the basement. Starts taking additional readings outside
2" Steel 53 PSI Gas Main
20% Gas
Oak Street
Gas mechanic arrives,
Lifts cover and gets
80% gas
20% Gas In Sewer Manhole
90% Gas
@ curb
43
47
53
55


Odor complaint call 3:34 pm
Dispatched 3:55 PM
Arrived at location 4:05 PM
Called for crew 4:10 PM
Check inside # 46 4:15 PM
Check outside next 25 min.
Gas mechanics arrive and find 80% gas
in electric service box 4:42 PM
46
50
54
Explosion occurs at 4:50 PM, a forty
Year old women was killed other injured
Explosion at # 50 occurs at 4:50 PM
2" Steel 53 PSI Gas Main
Cause of the leak attributed to a
short in electric service cables
caused current to flow onto
the steel gas main where
they crossed.
Arcing created holes in both the
electric conduit and the gas main
20% Gas
Oak Street
20% Gas In Sewer Manhole
Gas mechanic arrives,
Lifts cover and gets
80% gas
43
47
90% Gas
@ curb
53
55


Hazard
Extent
Life
Property

Evaluating The Leak



Where is the gas?

Evaluating The Leak

Where is the gas?

How much is there?

Extent of the hazard (migration)

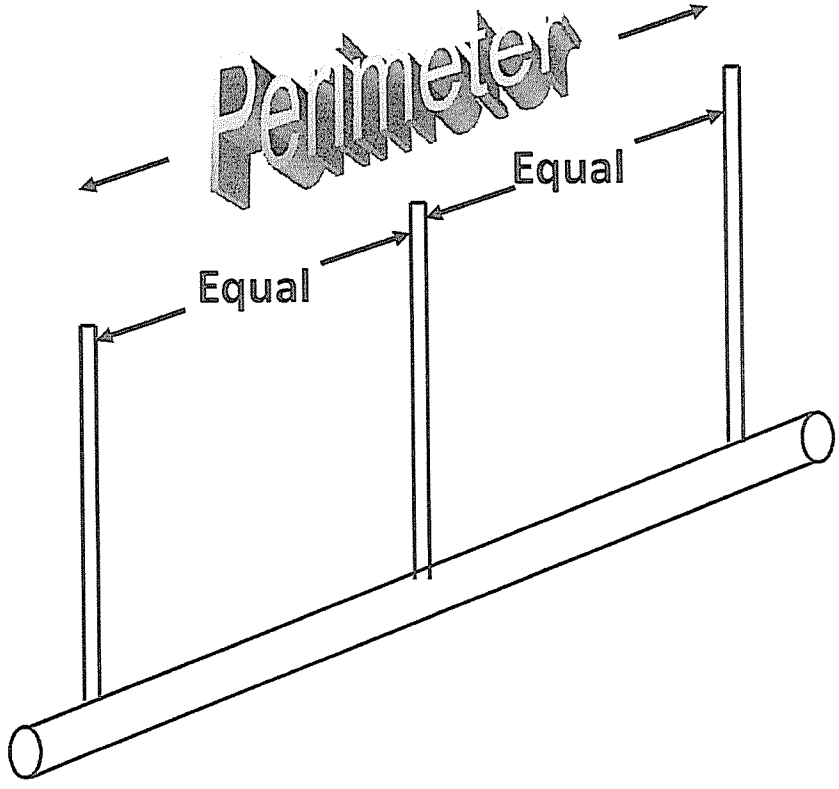
Relation to other structures

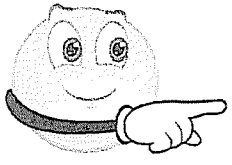
Evaluate/evacuate

“Centering” = Where is the Gas?

Centering The Leak

- Probe holes must be of sufficient depth
- Test all available openings
- "Zero out" N-S-E-W
- You must have sufficient information to make a good judgment





Be Careful – "Don't make a leak, looking for a leak."

Incident (2005)

- A homeowner contacted the gas company stating the "she smelled a very strong odor of gas in the vicinity of her gas meter".
- The gas company sent a service technician to investigate the odor complaint. Upon arrival, the technician noticed the smell of gas as soon as he got out of his truck.
- He decided to put a bar hole down near the riser to check the soil atmosphere. The temperature was around 5 degrees and there was frost in the ground making ti difficult to make the test hole.

Incident (2005)

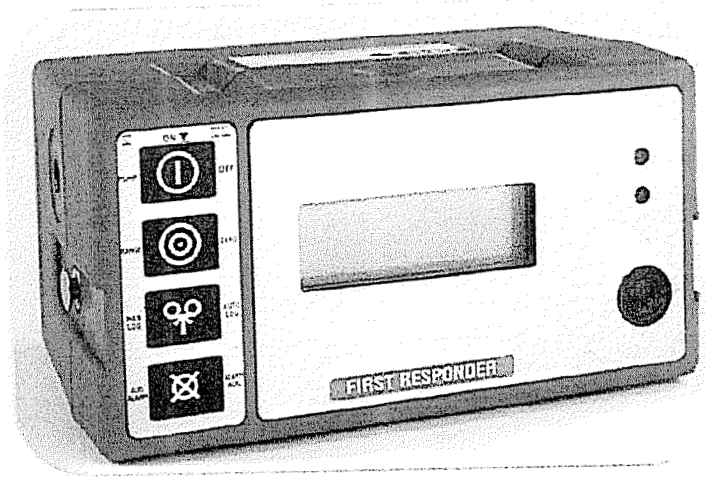
- After a lot of effort, he was able to get a test hole in the ground below the frost layer. When he pulled his probe bar out of the ground, gas started blowing up through the test hole. The escaping gas was making considerable noise so he put the probe bar back in the hole. He ran back to the truck to get a shovel to dig the plastic service in order to squeeze it off and stop the leak.
- As he was attempting to expose the service approximately 30 minutes after the line was hit, there was an ignition and two people inside of the home were injured.

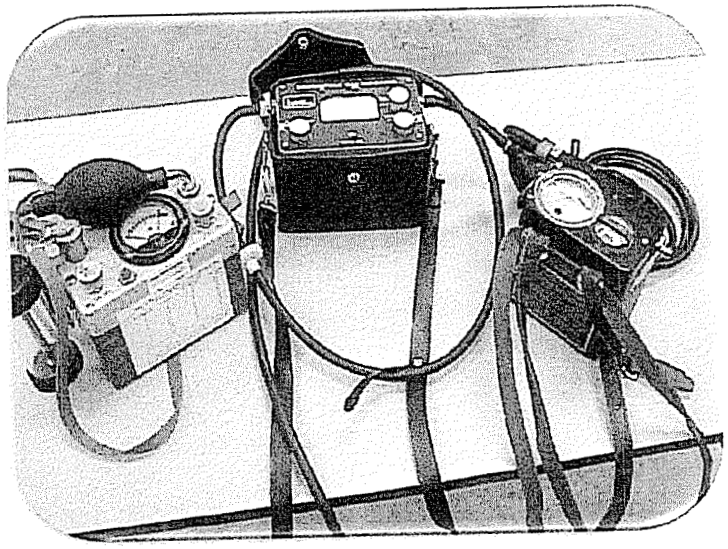
What Happened?

- Bar testing and checking the soil atmosphere for gas is a crucial part of the overall odor complaint investigation. It is necessary to make the hole a sufficient depth in order to obtain an accurate reading, thus getting below the frost layer is essential.
- In this case, the bar should have been left out of the bar hole to allow the gas to "vent" and notify the occupants to leave the house until the line could be shut off.
- The main priority is **Public Safety!**

The Combustible Gas Indicator

- CGI should be used to:
  - Classify an atmosphere
    - Inside a building or confined space
- Classify underground leakage
  - Determine "Where is the gas?"
- Pinpoint underground leakage
  - Determine "Where is the gas?"
- You must know:
  - How to properly use it
  - What readings might constitute a hazardous condition

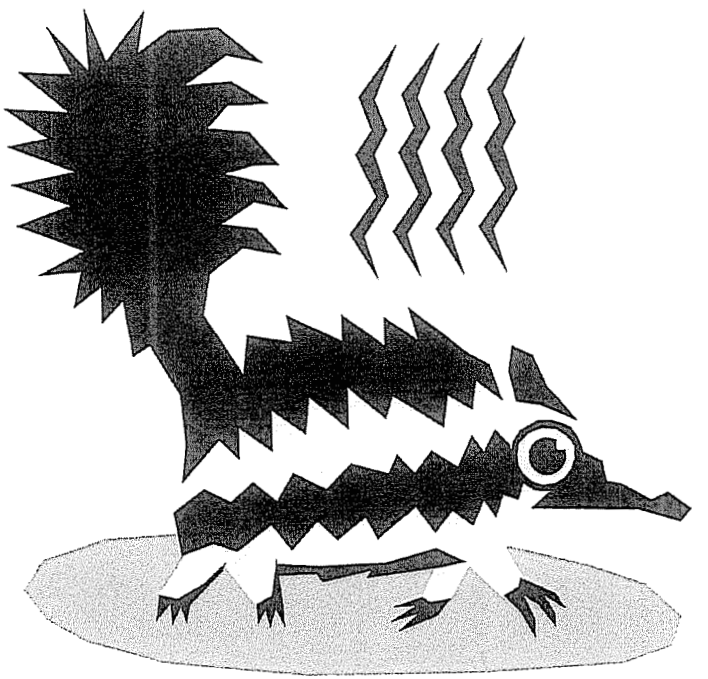




Odorization Issues

Factors Which Affect Odorant Quality

Physical ailments
Age
Masking
Distraction



Incident 2000
Company Retention $200K

- While parking the family car in his attached garage, a retired 83 year –old physician lost control of his automobile and struck the concrete block foundation that supported and elevated his home's heating and hot water equipment.
- The impact moved the boiler about one foot from its original position. The damage was severe enough to warrant an inspection, so the doctor called his regular plumbing and heating service provider who agreed to check the unit that afternoon.
- The doctor then called the local gas company and explained what had happened.

Incident (2000) Cont'd.
Company Retention $200K

- He was asked whether he smelled gas. He answered that he did not. The company's call center representative then explained that the company would not examine the damage unless he smelled gas, but if he did, he should please call back and they would gladly send someone out to his home.
- 90 minutes later the home exploded ad the doctor and his wife were severely burned. Les than one month later, suffering from severe burns over most of his body, the doctor died.

AEGIS Incurred $2.7 Million

What Happened?

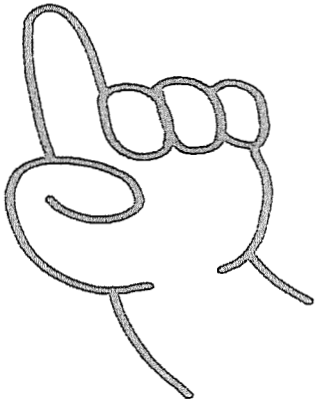
- At times the public and general public seek assistance from gas utilities for situations that are not commonly encountered. Such was the case in this unusual incident. The call center representative did not recognize the potential severity of a situation involving an automobile stiking the heating equipment.
- Listening to callers and their circumstances is critical to effectively achieve the ultimate goal of emergency response and the protection of life and property.
- The doctor, being 83 years old may have lost much of his sense of smell with age.

The call center is the "First Line of Defense"

Handling and Grading Natural Gas Leaks

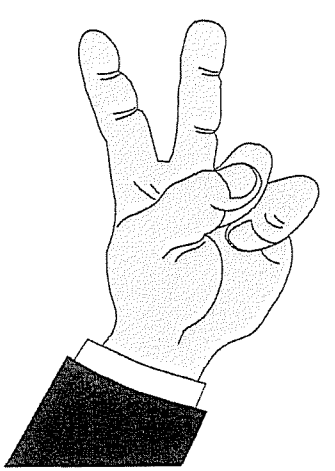
Class 1 Leak

A class 1 leak represents an existing or probable hazard to persons or property, and requires immediate repair or continuous action until the conditions are no longer hazardous.



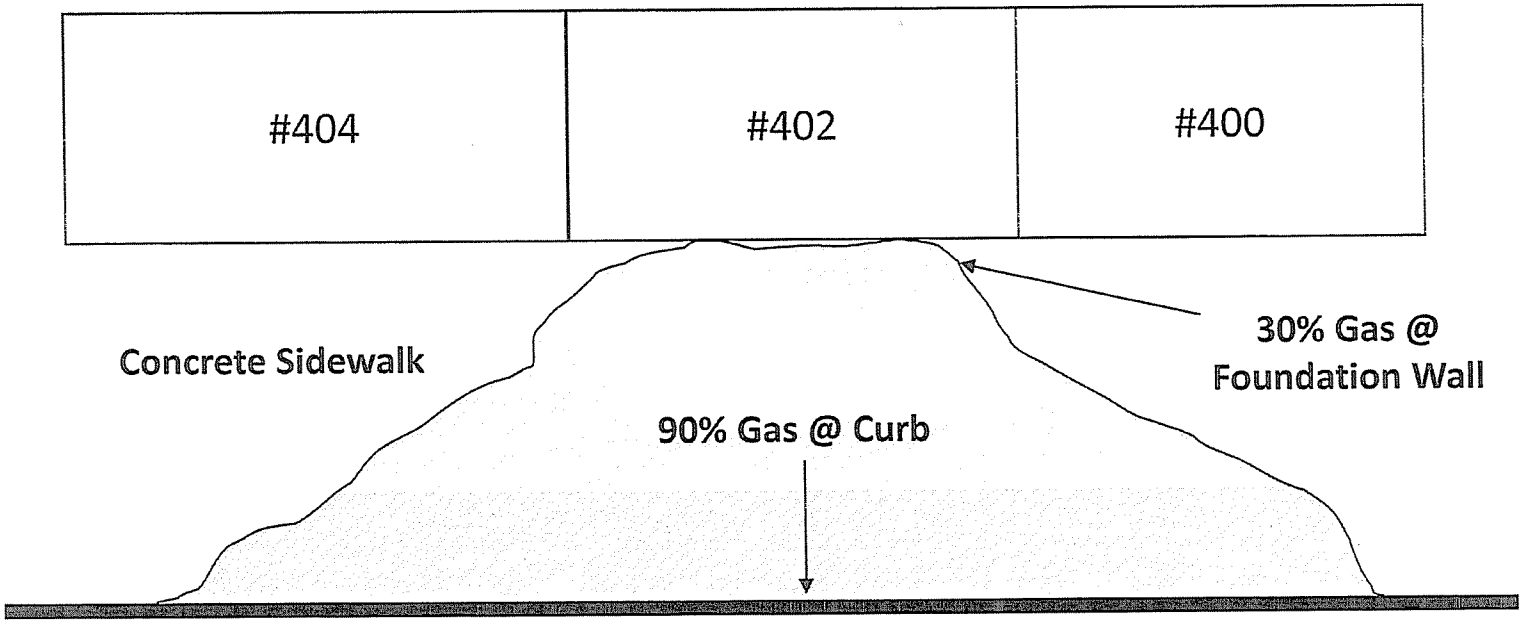
Class 2 Leak

A class 2 leak is recognized as be non-hazardous at the time of detection, but justifies scheduled repair based upon probable future hazard.



Class 3 Leak

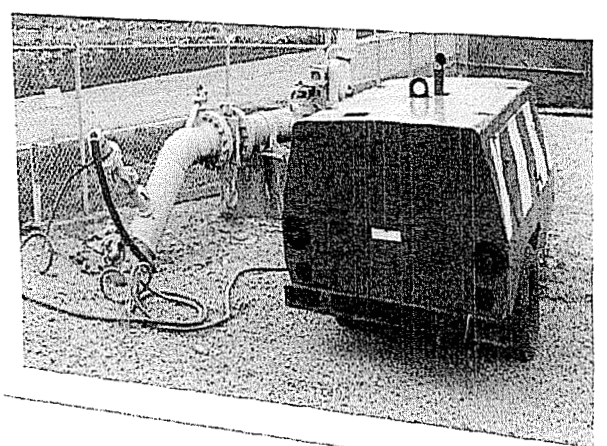
A class 3 leak is non-hazardous at the time of detection and can reasonably expected to remain non-hazardous. Must be re-inspected at intervals not exceeding 15 months, but at least once each calendar year.

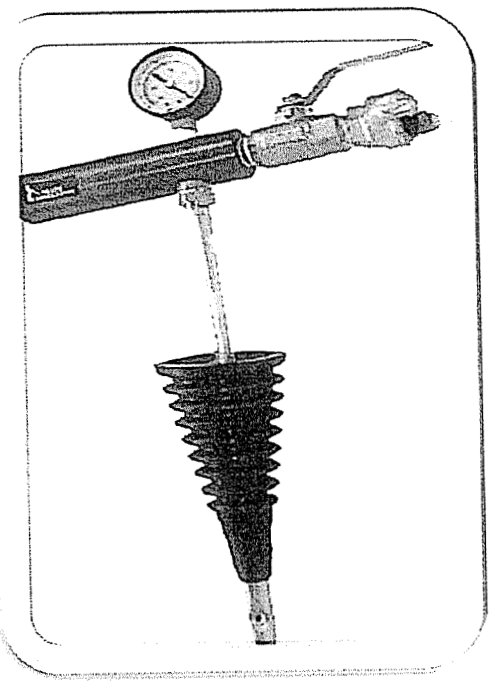


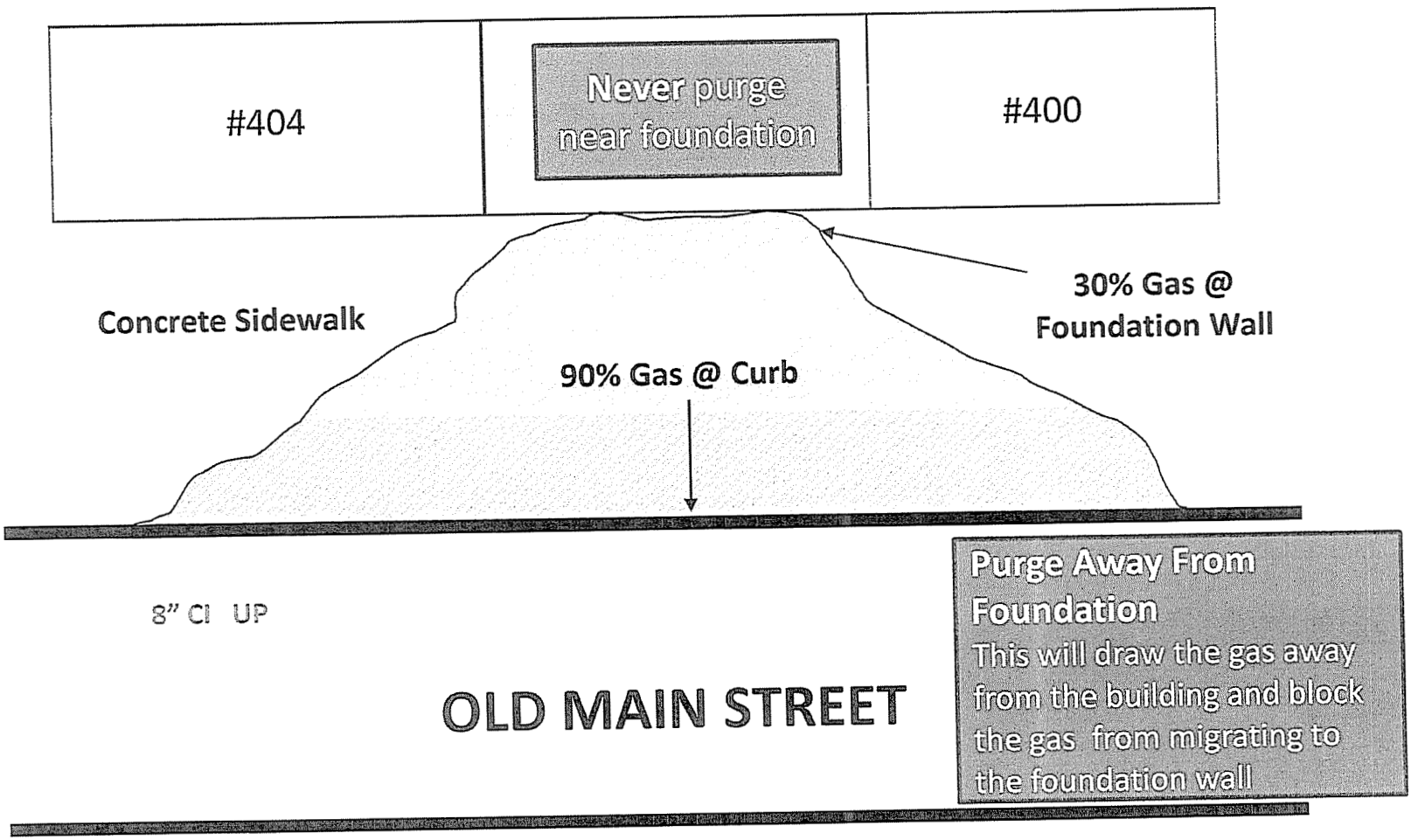
8" CI UP

OLD MAIN STREET

Soil Purgers/Aerators






#404
Never purge near foundation
#400
Concrete Sidewalk
30% Gas @ Foundation Wall
90% Gas @ Curb
8" CI UP
OLD MAIN STREET
Purge Away From Foundation
This will draw the gas away from the building and block the gas from migrating to the foundation wall

Emergency Response

Pre-planning Can Be Extremely Helpful

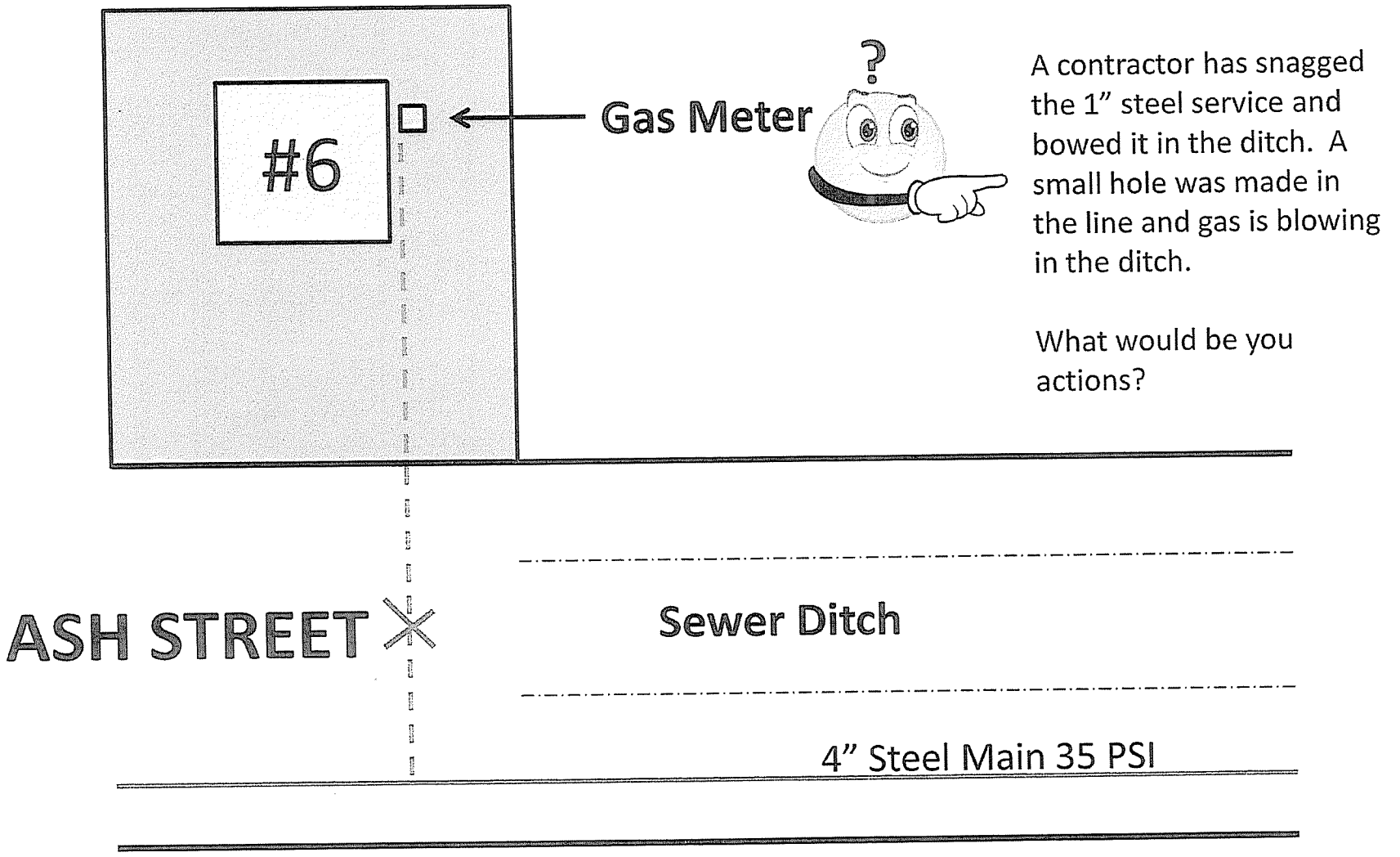
- Personnel readiness
- Personnel training
- Communication
- Emergency plan
- Coordination with fire service
- Availability of special equipment
- System records
- Involvement of claims & legal departments
- Public relations – media response

Response to "Dig-Ins"

Our main job is not
Finding & fixing leaks

Our main job is
PUBLIC SAFETY

FIND & FIX SYNDROME


#6
Gas Meter
?
A contractor has snagged the 1" steel service and bowed it in the ditch. A small hole was made in the line and gas is blowing in the ditch.
What would be you actions?
ASH STREET
Sewer Ditch
4" Steel Main 35 PSI

Incident (1998)
Company Retention $5M

- A contractor working on a highway reconstruction project struck the service line to a house , causing the service line to separate from a compression coupling near the gas main.
- The gas company was called at 11:15 am; a service tech arrived on the scene at 11:45 am and immediately called for a crew. Thinking the gas was venting out into the street, he sat in his truck for 20 minutes until the crew arrived. Although the damage location was only 32 feet from the incident site, no attempt was made to check nearby buildings with a combustible gas indicator for the presence of migrating gas.

Incident (1998)
Company Retention $5M Cont'd.

- The leaking gas migrated to the house where an explosion occurred killing an elderly woman and severely burning 3 children,, the explosion occurred at 1:00 pm. The children received burns to over 45% of their bodies with most of the burns occurring in the facial areas.
- In the settlement the contractor also paid more than $15,000,000.00 in claims.

AEGIS Incurred $15 Million

What Happened ?

- First Responder failed to recognize the gravity of the situation and made the assumption that the pulled line was leaking in only one place.
  - The First Responder's main job on a reported gas leak is to determine "Where is the gas?" and "Is it affecting people or property?" The appropriate way of determining this is with a combustible gas indicator (CGI) – <u>Test Don't Guess!</u>
- Our first priority must always be focused on

Public Safety

Hands-on for Leaks with Questions

OQS Task M-1
Perform Leakage and Patrolling Surveys on Gas Piping Facilities

The employee is qualified to perform OQS Task M-1 at the following level:

Without Supervision	Not Applicable
☐	☐

Perform leakage surveys of gas distribution piping

Performance Guide:
The person being evaluated for qualification:

- Demonstrated proper care, handling and calibration of leak instrument.
- Determined location of company facilities.
- Tested cracks in pavement or sidewalks, exterior walls and any other location that may indicate leakage.
- Tested adjacent structures for migration of gas.
- Demonstrated proper grading of leaks.
- Prepared proper completion of leak survey documentation.

_____
Evaluator's Initials

_____
Employee's Initials

_____
Date

Without Supervision	Not Applicable
☐	☐

Perform line patrolling surveys of gas distribution piping

Performance Guide:
The person being evaluated for qualification:

- Determined if pipe was exposed or buried.
- Determined if pipe was anchored and condition of anchor.
- Demonstrated ability to read company maps.
- Determined type of patrol (foot, motor or aerial).
- Noted condition of exposed pipe, painting, coating, etc.
- Recorded points patrolled.

_____
Evaluator's Initials

_____
Employee's Initials

_____
Date

M-1
Knowledge Assessment
Perform Leakage and Patrolling Surveys on Gas Piping Facilities

1. A business district is any distinct area that is used primarily to conduct private or government business.

   - **True**

2. Public buildings include barns, sheds, and residential homes.

   - **False**

3. Factors that adversely or limit surface gas detection include excessive wind, soil moisture, snow and _____.

   - **surface sealing by ice**

4. Distribution leak surveys are applicable to _____

   - **all distribution mains, service lines up to the outlet of the meter, meter and regulator stations**

5. All distribution pipelines in business districts shall be leakage surveyed at intervals not exceeding _____.

   - **at least once each calendar year, not to exceed 15 months**

6. Special leak surveys shall be performed to ensure public safety anytime_____.

   - **a portion of the system has been subjected to abnormal stress, cast iron or wrought iron main are adjacent to an excavation, pipelines subjected to unusual stress such as blasting**

7. Leakage surveys shall be performed using electronic instruments that are capable of detecting concentrations of 50 PPM or less of gas in air.

   - **True**

8. To confirm leak indications, a combustible gas indicator shall be used. In addition, bubble leakage test may be used to confirm leak indications on exposed piping.

   - **True**

9. A leak that is non-hazardous at the time of detection and can be reasonably expected to remain non-hazardous is classified as _____.

- **Grade 3**

10. A classification of leaks that represents existing or probable hazards to persons or property, and requires immediate repair or continuous action until the conditions are no longer hazardous is _____. (M.1.1.23)

- **Grade 1**

11. A leak that is non-hazardous at the time of detection but justifies scheduled repair based on probable future hazard _____.

- **Grade 2**

12. Grade 1 leaks are not applicable for re-evaluation..

- **True**

13. Grade 2 should be re-evaluated at least once each calendar year until reclassified or repaired.

- **False**

14. All instruments used in leakage surveys of classifying leaks shall be calibrated in accordance with manufacturers' guidelines.

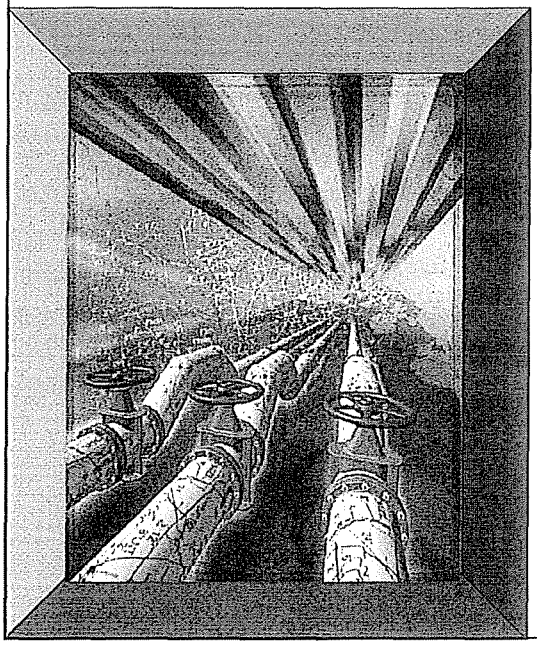
- **True**

Original Leak Detection Class

For OQMI

On First Qualification

Kentucky Utilities/Louisville Gas and Electric



Perform Patrol and Leakage Surveys on Gas Pipeline Facilities OQ Task M-1

Technical Training and Safety
LG&E
Preparing The Workforce Of Tomorrow

POWERGEN

Objectives

- Identify factors basic to patrol and leakage surveys of gas pipelines.
- Perform patrol and leakage surveys of gas distribution systems.
- Perform patrol and leakage surveys of gas transmission piping systems.

2

D.O.T. Standard 192.613 Continuing Surveillance

(a) Each operator shall have a procedure for continuing surveillance of its facilities to determine and take appropriate action concerning changes in class location, failures,leakage history, corrosion, substantial changes in cathodic protection requirements, and other unusual operating and maintenance conditions.

3

D.O.T. Standard 192.613 Continuing Surveillance

(b) If a segment or pipeline is determined to be in unsatisfactory condition but no immediate hazard exists, the operator shall initiate a program to recondition or phase out the segment involved, or, if the segment cannot be reconditioned or phased out, reduce the maximum allowable operating pressure in accordance with 192.619 (a) and (b).

4

The importance of this task...

- They help protect customers and the general public.
- They help conserve gas and company assets.
- They are required by state and federal regulations.

5

Continuing Surveillance

Periodic visual inspection of facilities such as the following:

- Changes in population
- Effect of exposure of movement of pipeline facilities
- Potential for or evidence of tampering, vandalism, or damage
- Effects of encroachments on pipeline facilities
- Potential for gas migration into buildings from vaults and pits through air intakes
- Specific circumstances relating to patrolling and leakage
- Potential for, or evidence of, soil or water accumulation in vaults or pits

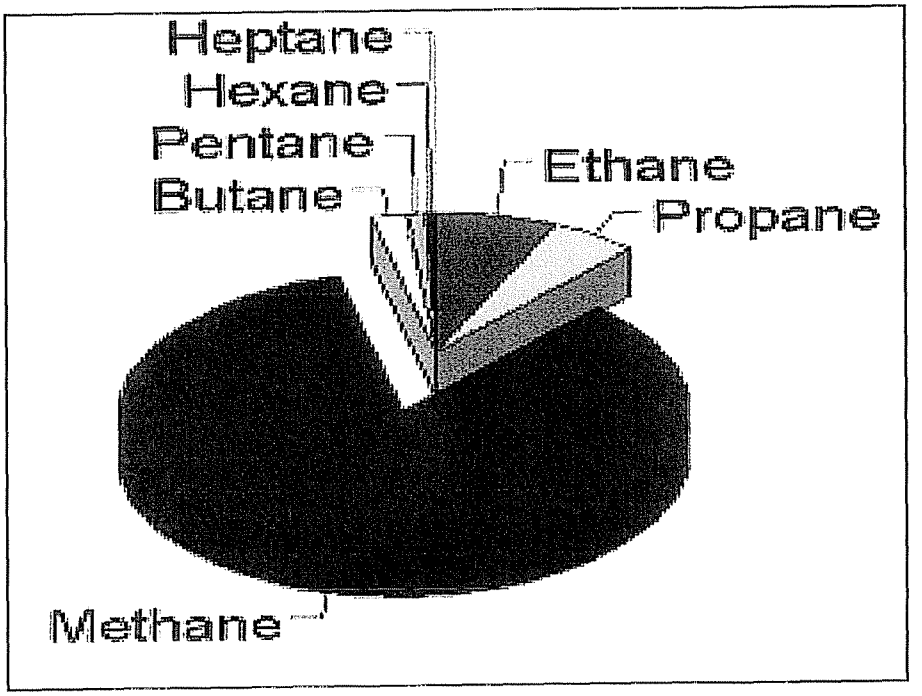
6

Continuing Surveillance

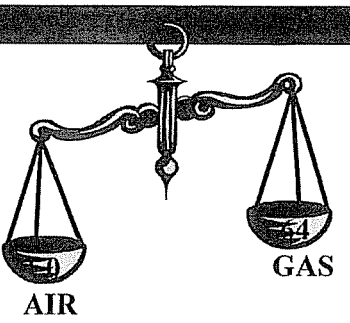
Periodic review and analysis of records, such as the following:

- Patrols
- Leakage surveys
- Valve inspections
- Vault inspections
- Pressure regulating, relieving and limiting inspections
- Corrosion control inspections
- Facility failure investigation

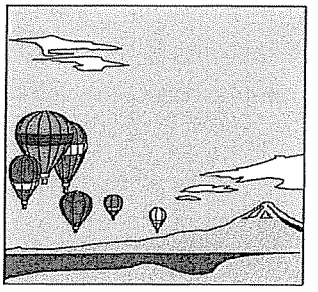
7



SPECIFIC GRAVITY



GAS IS LIGHTER THAN AIR SO IT WILL RISE AND DISSIPATE INTO THE ATMOSPHERE



9

- ***Natural Gas***
- ***has no odor***
- ***to aid in the***
- ***detection of gas leaks***

- ***"ODORANTS" are added***
- ***They have little or no***
- ***effect on the***
- ***combustion of gas***

10

Definitions Applicable to Performing Patrol and Leakage Surveys

- ***Bar hole:*** A hole that is made in the soil or paving for the specific purpose of testing the subsurface atmosphere with a CGI.
- ***Building*:** The structure which is normally or occasionally entered by humans for business, residential or other purposes, and in which gas could accumulate.
- ***Class 1 Location:*** A location along a transmission pipeline that has 10 or fewer buildings intended for human occupancy in the equivalent area of one mile along the pipeline, and 220 yards either side of the pipeline, or any offshore area.
- ***Class 2 Location:*** A location along a transmission pipeline that has more than 10 but fewer than 46 buildings intended for human occupancy in the equivalent area of one mile along the pipeline, and 220 yards either side of the pipeline.

11

Definitions Applicable to Performing Patrol and Leakage Surveys

- ***Class 3 Location:*** A location along a transmission pipeline that has 46 or more buildings intended for human occupancy in the equivalent area of one mile along the pipeline, and 220 yards either side of the pipeline.
- **Class 4 Location:** Any class location where buildings with four or more stories aboveground are prevalent.
- ***Combustible Gas indicator (CGI):*** A device capable detecting and measuring gas concentrations (of gas being transported) in the atmosphere.
- ***Confined Space:*** Any subsurface (such as vaults, tunnels, catch basins or manholes) of sufficient size to accommodate a person, and in which gas could accumulate.
- ***Follow-up Inspection:*** An inspection performed, after a repair has been completed, to determine the effectiveness of the repair.

12

Definitions Applicable to Performing Patrol and Leakage Surveys

- ***Gas Associated Substructure:*** A device or facility utilized by a gas company (such as a valve box, vault, test box or vented casing pipe) which is not intended for storing , transmitting or distributing gas.
- ***L.E.L.:*** The lower explosive limit of the gas being transported.
- ***Natural Gas:*** A mixture of gases, primarily methane, that is lighter than air.
- ***Petroleum Gas:*** Mixtures of propane, butane, (other than gas-air mixture that is used to supplement supplies to a natural gas distribution system) that is heavier than air.
- ***Prompt-Action:*** Dispatching qualified personnel without delay for the purpose of evaluating and, where necessary, abating the existing or probable hazard.

13

Definitions Applicable to Performing Patrol and Leakage Surveys

- ***Reading:*** A repeatable deviation on a CGI or equivalent instrument, expressed in LEL. Where the reading is in an unvented confined space, consideration should be given to the rate of accumulation when the space is resealed.
- ***Small Substructures:*** (Other than gas associated substructures) are any subsurface that are of insufficient size to accommodate a person (such as telephone and electrical ducts and conduit or no-gas-associated valve and meter boxes), an in which gas could accumulated or migrate.
- ***Tunnel:*** A subsurface passageway large enough for a person to enter and in which gas could accumulate.

14

15

Leakage Surveys and Test Methods

(1) Surface Gas Detection Survey:

- A continuous sampling of the atmosphere at or near ground level with a gas detection system capable of detecting a concentration of 50 PPM of gas in air.
- Performed using either mobile or portable equipment
  - Portable equipment sample taken no more than 2" above surface.
  - Under pavement should be taken also at curb line
  - Available openings
    - manholes, catch basins, sewer, power and telephone duct openings
- Limited due to adverse conditions such as wind, soil, moisture, snow and surface sealing by ice or water.

16

Leakage Surveys and Test Methods

(2) Subsurface Gas Detection Survey:

- Defined as the sampling of the subsurface atmosphere with a combustible gas indicator (CGI) or other approved device capable of detecting 0.5% gas in air (5,000 parts per million) at the sample point.
- Sample points as close as possible to the gas main
  - never more than 15' laterally
  - sampling points should be at 30' intervals unless the nearest building wall is shorter than 15'
  - sampling should be 10' where buildings are closer than 15' to the main

17

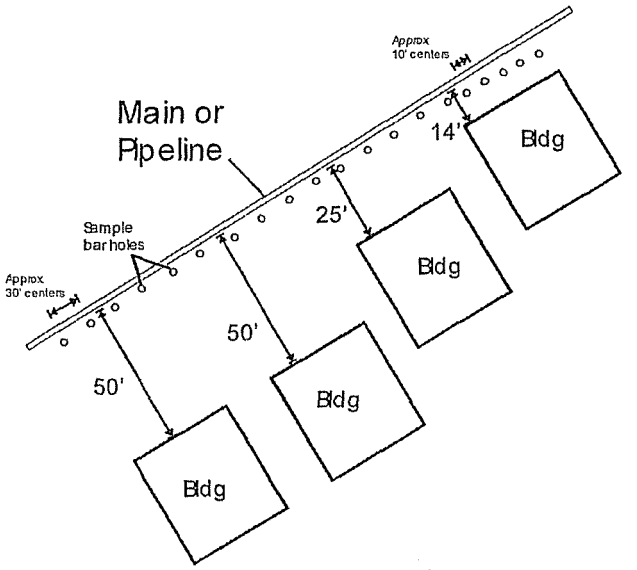


Figure 1. Sampling Intervals Along a Main

Leakage Surveys and Test Methods

Sampling Patterns

- The sampling pattern should include sample points adjacent to service taps, street intersections, and known branch connections, as well as over or adjacent to buried service lines at the building wall.
- When bar testing near coated pipelines or PE pipe: ***EXERCISE CARE***
- Sampling points should be of sufficient and uniform depth to directly sample the atmosphere adjacent to the pipeline.

19

Leakage Surveys and Test Methods

(3) Vegetation Survey

- Visual observations of vegetation
  - abnormal or unusual color of vegetation
  - dead or dying vegetation
- Approved instrument must be utilized to verify and/or determine the magnitude of suspected leakage
- Considerations
  - system layout
  - amount and type of vegetation
  - visibility conditions such as lighting, terrain, and obstructions
- Vegetation surveys should not be conducted under the following:
  - soil moisture abnormally high
  - vegetation is dormant
  - vegetation is in an accelerated growth period

20

Leakage Surveys and Test Methods

(4) Pressure Drop Test

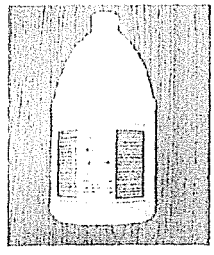
- Isolating a segment of pipeline to determine if it loses pressure due to leakage.
- Testing conducted on existing facilities solely for the purpose of detecting leakage should be performed at a pressure at least equal to operating pressure.
- Test medium must comply with 192.503 (b)
- Test medium must be liquid, air, natural gas, or inert gas that is:
  - compatible with the material of which pipeline is constructed
  - relatively free of sedimentary materials
- Except for natural gas, nonflammable
- Test pressure sufficient to detect leakage
  - volume under test
  - time required for the test medium to be temperature stabilized
  - sensitivity of the test instrument

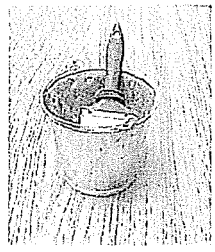
21

Leakage Surveys and Test Methods

(5) Bubble Leak Test

- Defined as the application of soapy water or other foaming solution on exposed piping to detect the presence of a leak.
- Applicable to only exposed piping.
- Leaks are detected by the presence of bubbles.





Leakage Surveys and Test Methods

(5) Ultrasonic Leak Test

- Consist of testing exposed piping facilities with an instrument capable of detecting the ultrasonic energy generated by natural gas.
- The following should be considered:
  - as line pressure increases, the magnitude of the ultrasonic energy generated by the leak increases
  - objects near or surrounding the facility being tested may reflect or attenuate the ultrasonic energy generated, making it difficult to detect or pinpoint the leak
  - number of leaks in a given area can create a high ultrasonic background level, which may reduce the detection capabilities
  - pneumatic and gas operated equipment generate ultrasonic energy

23

Leak Detection Instruments and Their Applications

Flame Ionization (FI)

- Search

Combustible Gas Indicator (CGI)

- Locate, Pinpoint and Classify

Bead Type Sensor

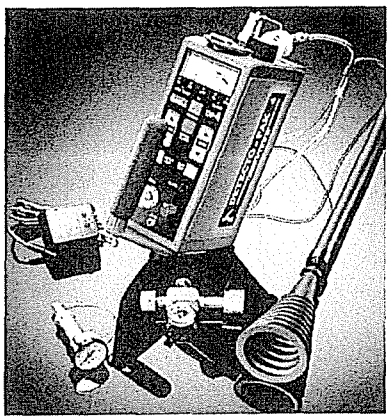
- Detects atmospheric change
- Locates leaks on fittings and exposed piping
- Cannot be used on leak survey of buried pipe

24

Leak Detection Instruments and Their Applications

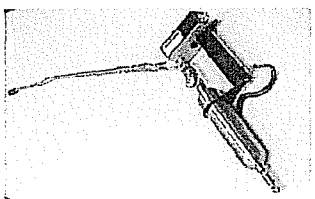
Flame Ionization

- Uses hydrogen fuel to power a small flame in a detector cell.
- Meters indicated concentrations from 1PPM to 10,000 PPM (same as 1% gas-in -air.
- Registers presence of hydrocarbons
- Equipped with audible alarms.

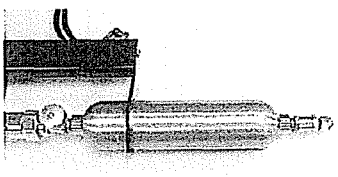


25

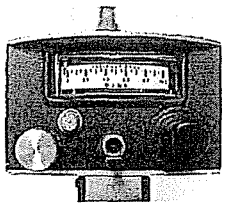
Southern Cross Flame Ionization Unit



Flame Ionization Unit

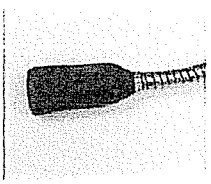


Fuel Tank



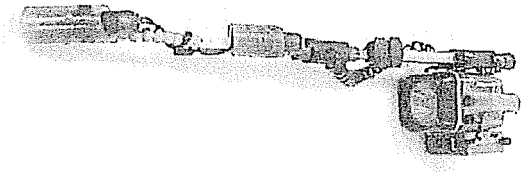
Scale

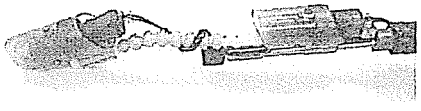
Probe Assembly



Filter & End Probe

Pragmatic Leak Survey Instrument





Dual Sensors

27

Leak Detection Instruments and Their Applications

W
A
R
N
I
N
G

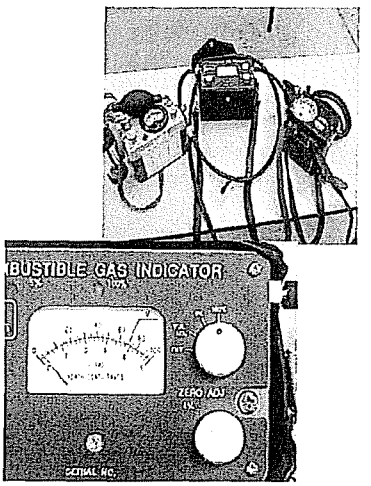
Flame Pack should not be in an explosive atmosphere and should never be used inside a regulator building.

28

Leak Detection Instruments and Their Applications

Combustible Gas Indicator

- Dial on the instrument indicates percentage of flammable gas in air (percent gas scale)or percent of the lower explosive limit (LEL) scale.
- Instruments must be calibrated
- Not suitable for sampling unconfined air over a pipeline or near the ground surface.
- Use extra precaution to prevent damage to piping when barholing in the area of Polyethylene pipe.



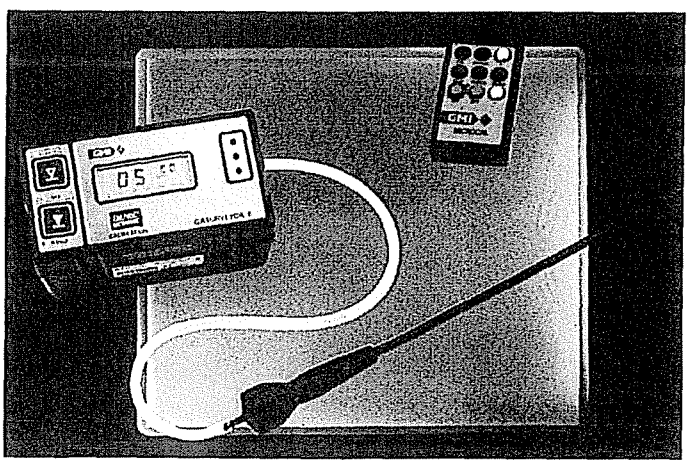


Figure 3b. Combustible Gas Indicator
(Digital Meter, Vacuum Pump Sampling)

30

Reading Instrument Measurements

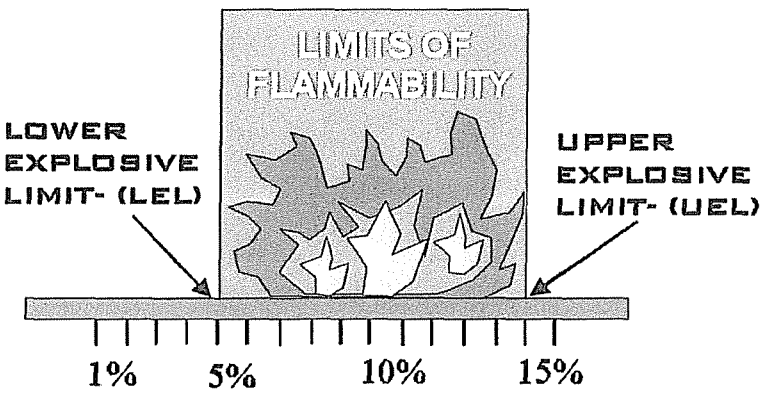


Figure 4. Natural Gas Flammability Limits

31

Reading Instrument Measurements

- Locations that have gas-in-air mixtures above the upper explosive limit (UEL) are definitely classified as hazardous atmospheres, and work in and near such areas requires special precautions, personal protection equipment, and procedures.

32

Reading Instrument Measurements

1,000 ppm gas-in-air	= 0.1% gas-in-air mixture
5,000 ppm gas-in-air	= 0.5% gas-in-air mixture
50,000 ppm gas-in-air	= 5% gas-in-air mixture = 100% of L.E.L.

Decimal expression of parts per million and gas-in-air percentages.

0.000001	1 part per million	
0.00001	10 parts per million	
0.0001	100 parts per million	
0.001	1,000 parts per million	
0.01	10,000 parts per million	= 1% Gas-in-air; 1/5 of L.E.L.
0.1	100,000 parts per million	= 10% Gas-in-air
1	1,000,000 parts per million	= 100% Gas-in-air

Chart 1. Comparison of Per Cent Gas-In-Air Mixtures and Gas in Parts Per Million

33

Reading Instrument Measurements

1% gas-in-air mixture for natural gas can be expressed as 10,000 PPM, and is significant because it is 1/5 of the LEL, and the level at which gas odorization should be detectable to a person with a normal sense of smell.

34

Calibration of Instruments

- Instruments used for leak detection and evaluation should be calibrated in accordance with the manufacturer's recommended calibration instructions, and after any repair or replacement of parts.
- On a regular schedule giving consideration to the type and usage of the instrument involved.
- HFI systems and CGI instruments should be checked for calibration at least once each month while in use.
- ***At any time it is suspected that the instrument's calibration has changed.***

35

Leakage Classification and Action Criteria

- **Step 1** Determine the leak perimeter
- **Step 2** Determine if leak extends to building(s)
- **Step 3** Apply leak action criteria

36

Grade 1 Leak

Group	Definition	Action Criteria	Examples
1	A leak that represents an existing or probable hazard to persons, property, and requires *immediate repair or* continuous action until the conditions are no longer hazardous.	Requires *prompt action** to protect *life and property, and continuous* action until conditions are no longer hazardous. *Prompt action in some instances may require one or more of the following: a. Implementation of company emergency plan (192.615). b. Evacuating premises. c. Blocking off an area d. Rerouting traffic. e. Eliminating sources of ignition. f. Venting the area. g Stopping the flow of gas by closing valves or other means. h. Notifying police and fire departments.	1. Any leak which, in the judgment of *operating personnel* at the scene, is regarded as an immediate hazard. 2. Escaping gas that has ignited. 3. Any indication of gas which has migrated into or under a building, or into a tunnel. 4. Any reading at the outside wall of a *building, or where gas would likely* migrant to an outside wall of a building. 5. Any reading of 80% LEL or greater, in a confined space 6. Any reading of 80% LEL, or greater in small substructures (other than gas associated substructures) from which gas *would likely migrate to the outside* wall of a building. 7. Any leak that can be seen, heard, or felt, and which is in a location that may endanger the general public or property.

37

Grade 2 Leak

Group	Definition	Action Criteria	Examples
2	A leak that is recognized as being non-hazardous at the time of detection, but justifies scheduled repair based on probable future hazard.	Leaks should be repaired or cleared within one calendar year, but no later than 15 months from the date the leak was reported. In determining the repair priority, *criteria such as the following* should be considered a. Amount and migration of gas b. Proximity of gas to building *and subsurface structures.* c Extent of pavement. d. Soil type, and soil conditions (such as frost cap, moisture, and natural ventilation. Grade 2 leaks should be reevaluated once every 6 months until cleared. The frequency of reevaluation should be determined by the location and magnitude of the leakage condition.	A. Leaks Requiring Action Ahead of Ground Freezing or Other Adverse Changes in *Venting Conditions.* Any leak which, under frozen or adverse soil conditions, would likely migrate to the outside wall of a building B. Leaks requiring action within 6 months. 1. Any reading of 40% LEL, or greater, under sidewalk in a wall-to-wall paved area that does not qualify as a *Grade* 1 leak. 2. Any reading of 100% LEL, or greater, under a street in a wall-to-wall paved area that has significant gas migration and does not qualify as a Grade 1 leak. 3. Any reading less than 80% LEL in small substructures (other than gas associated substructures) from which gas would likely migrate creating a *probable future hazard.* 4. Any reading between 20% LEL and 80% LEL in a confined space.

38

Grade 2 Leak Continued

Group	Definition	Action Criteria	Examples
2	A leak that is recognized as being non-hazardous at the time of detection, but justifies scheduled repair based on probable future hazard.	Grade 2 leaks may vary greatly in degree of potential hazard. Some Grade 2 leaks, when evaluated by the above criteria, may justify scheduled repair within the next 5 working days. During the working day on which the leak is discovered, these situations should be brought to the attention of the individual responsible for scheduling leak repair. *On the other hand, many Grade 2* leaks, because of their location and magnitude, can be scheduled for repair on a normal routine basis with periodic reinspection as necessary	5. Any reading on a pipeline operating at 30% SMYS, or greater, in a Class 3 or 4 location, which does not qualify as a Grade 1 leak. 6. Any reading of 80% LEL, or greater, in gas associated substructures. 7. Any leak which, in the judgment of operating personnel at the scene, is of sufficient magnitude to justify scheduled repair

39

Grade 3 Leak

Group	Definition	Action Criteria	Examples
3	A leak that is non-hazardous at the time of detection and can be reasonably expected to remain non-hazardous.	These leaks should be reevaluated during the next scheduled survey, or within 15 months of the date reported, whichever occurs first, until the leak is regraded or no longer results in a reading	Leaks Requiring Reevaluation at Periodic Intervals 1. Any reading of less than 80% LEL in small gas associated substructures. 2. Any reading under a street in areas without wall-to-wall paving where it is unlikely the gas could migrate to the outside wall of a building. 3. Any reading of less than 20% LEL in a confined space.

40

Pinpointing Gas Leaks

Converging Barhole Test Method

- Most widely used method for pinpointing leaks in buried piping.
- Before the leak is pinpointed the perimeter of the leak is established (centering).
- Determine area of strongest concentration.
- Testing is started at the outside of the pattern.
- If soil is saturated with gas then holes may need to be purged.
- Barhole depths need to be uniform:
  - diameter
  - depth
  - slightly deeper than bottom of the main

41

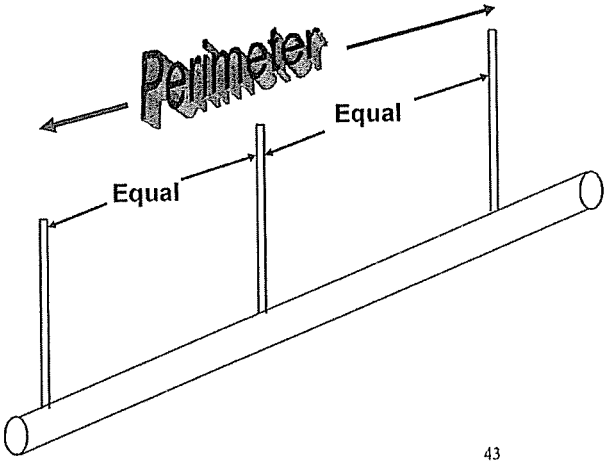
Pinpointing Gas Leaks

Barhole Placement Over Pipeline

- Series of three barholes initially.
- One hole placed at the point centering and line location that indicate where the leak occurred.
- Compare the readings of the three holes to determine where additional holes need to be placed.
- Be consistent.

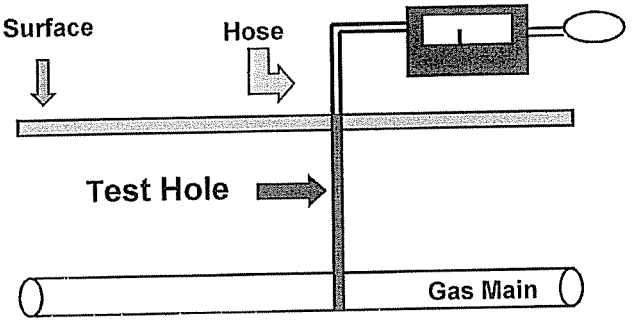
42

Pinpointing Gas Leak With A CGI Converging Barhole Method



43

Pinpointing Gas Leak With A CGI Converging Barhole Method



Typical Barhole Test

44

Pinpointing Gas Leaks

Basic Actions to Pinpointing Gas Leaks

- Establish complete perimeter
- Locate underground piping
- Barhole a series of evenly space holes of equal depth and distance along the pipe
- Test holes with a CGI
- Compare readings
- Determine greatest concentration and then place barholes at 3 foot intervals
- Retest barholes
- After leak repair, check to make sure the source of leak has been eliminated

45

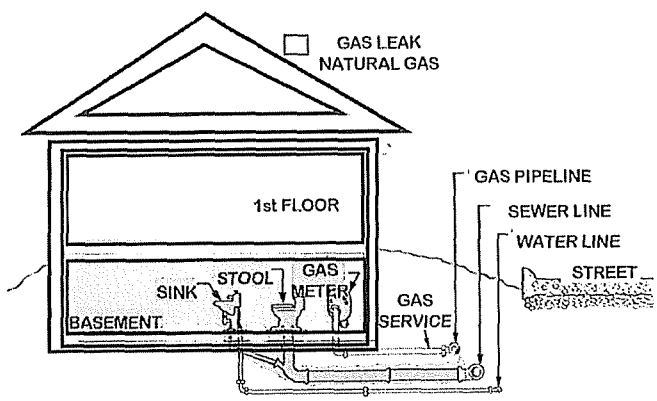


Figure 5a. Migration Pattern Near a Structure

46

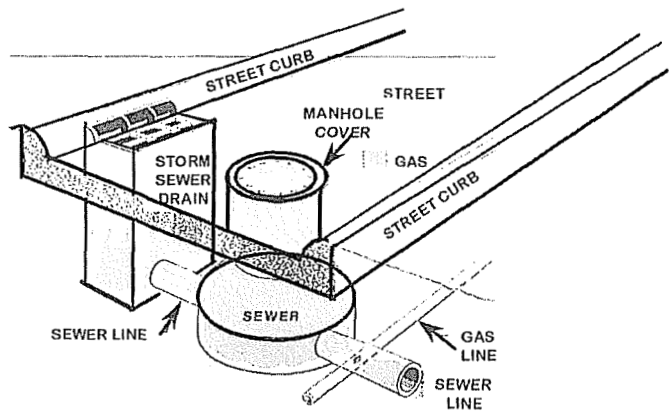


Figure 5a. Migration Pattern Near Sewer Drainage, Streets, Curbs and Gutters

47

Pinpointing Gas Leaks

Where Is The Gas?

- ***W***here is the gas? (CGI to confirm gas is present)
- ***H***ow much is there? (Take readings with a CGI)
- ***E***xtent of the spread? (Determine migration)
- ***R***elation to other structures? (Buildings or manholes)
- ***E***valuate/evacuate? (Classify leak and take action)

48

Follow-Up Inspection and Reevaluation of a Leak

- Check the repair before backfilling
- Check the perimeter with a CGI
- Where gas saturated soil, a follow up inspection should be done ASAP after allowing the soil atmosphere to vent, but no later than 1 month after repair

49

Documenting Leak Surveys, Repairs, and Pipeline Patrols

- Records are to kept of all leak surveys, repairs, and other pipeline patrolling activities.
- Accurate documentation

50

Documenting Leak Surveys, Repairs, and Pipeline Patrols

GAS LEAK AND REPAIR REPORT

Form 1

COMPANY: _____

Receipt of Report:
Date: _____ Time: _____

Location of Leak: _____
(Address, house no., etc.)

Reported by: _____ (Name) _____ (Address)

Description of Leak: _____
(Leak reading)

Leak Detected by: _____
Leak Reported by: _____
Report Received by: _____

Dispatched
Date: _____ Time: _____
Investigation Assigned to: _____ (Name)

Assigned as Immediate Action Required? Yes _____ No _____

Investigation
Date: _____ Time: _____
Investigation by: _____ Leak Found? Yes ____ No ____
CGI Used? Yes _____ No _____ Leak Grade 1 ____ 2 ____ 3 ____
Location of Leak: _____

Cause of Leak: _____
Condition Made Safe: Date: _____ Time: _____

Repair Report
Length of Pipe Exposed: _____ feet
Leak at: Threads ____ Coupling ____ Weld (give type) ____ Valve ____ Other ____
Pipe: Size: ____ Inches/Steel( ) Plastic( ) Cast Iron( ) Other( ) Depth ( )
Coating: Enamel ( ) Wrapped ( ) Galvanized ( ) Other ( )
Condition: Excellent ( ) Good ( ) Fair ( ) Poor ( )
Soil Conditions: Sand ( ) Clay ( ) Loam ( ) Other (describe) _____
Moisture: Dry _____ Damp _____ Wet _____
Repairs Made: _____

Repair Coating Type: Mastic ( ) Hot Applied Tape ( ) Other (describe) _____
Anodes Installed: How many? ____ Anode Weight ____ lbs Depth Installed ____
Repairs Made by: _____ Date _____
(Name)
Foreman: _____ Supervision: _____
(Signature) (Name)
Posted by: _____ Date: _____

GAS DISTRIBUTION INSPECTION AND LEAKAGE REPAIR

Form 3

COMPANY: _____
ADDRESS: _____

Grade of Leak Case
Grade I _____
Grade II _____
Grade III _____

SKETCH SHOWING LEAKS LOCATED

METER SET

Meter No. _____ (if inspected)

LEAK DATA

Detected By	Collecting	Probable Source	C.G.I. Test
Mobile Flame Pack	In Building	Main/Line	Gas Percent (%)
Flame Pack	Near Building	Service Line	L.E.L.
Visual/Vegetation	In Manhole	Service Tap	P.P.M.
Combustible Meter	In Soil	Valve	Negative
Odor	In Air	Meter Set	
Bar Hole	Other	Tee	

Pressure	Surface	Leak Cause
Low	Lawn	Corrosion
Intermediate	Soil	Outside Force
High	Paved	Construction Defect
	Other	Material Failure
		Other

Component	Explanation	Part of System	Pipe Type	Size	Year Installed
Pipe		Main	Steel		
Valve		Service	Cast Iron		
Fitting		Meter Set	Plastic		
Drip		Customer Piping	Other		
Drip Connection		Other			
Regulator					
Other					

Pipe Condition: Good: _____ Fair: _____ Poor: _____

Coating Condition: Good: _____ Fair: _____ Poor: _____

Date Repaired: _____ Date Reclocked: _____

Remarks: _____

J 1

Documenting Leak Surveys, Repairs, and Pipeline Patrols

Example of Gas Leak and Repair Report

Piping System Name
District Name: District Number:
Report Number: Main Number:
Leak Classification Car
For:
Street Address:
Leak Reported by: Date:
Time Leak Detected am/pm Length of Time Gas Escaped
Time Dispatched Time Arrived
Tested by: Date:

Sketch Showing Leaks Located:
Note leak locations on sketch with an 'X'

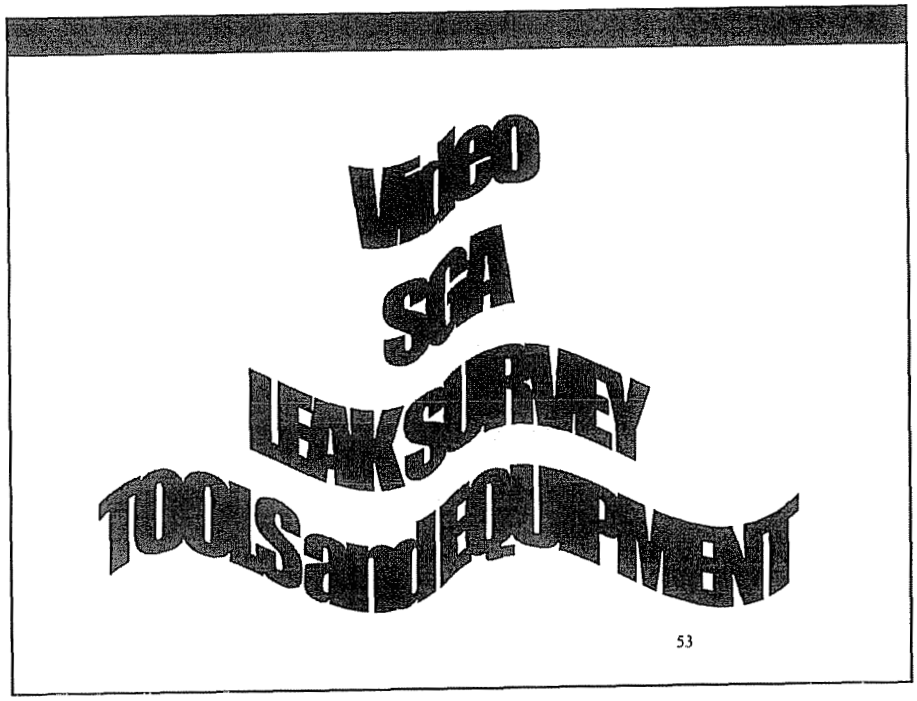
Fill out form completely:

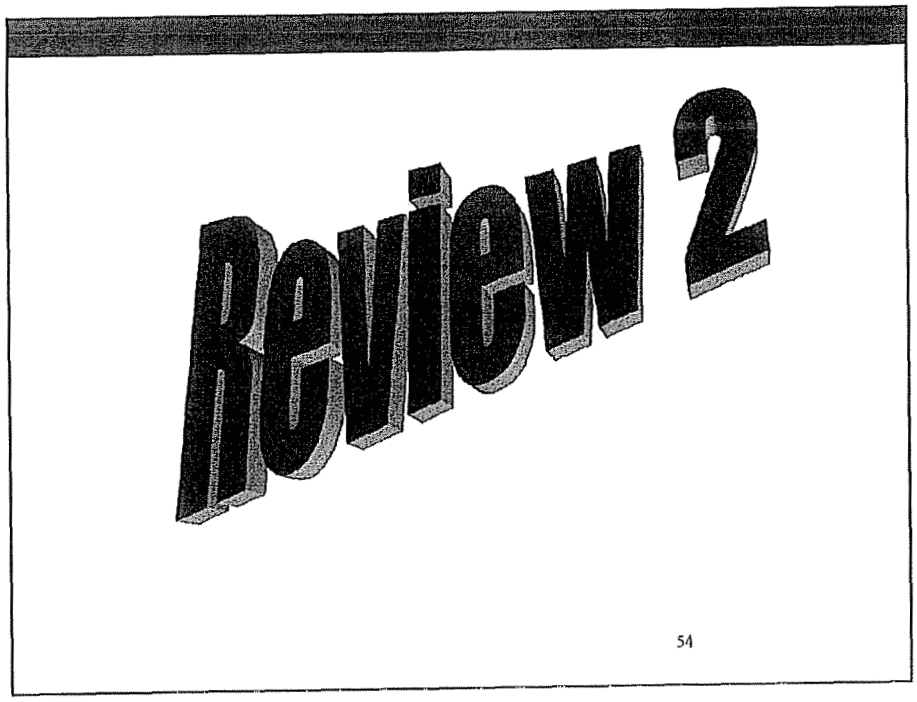
Detected by	Collecting	Probable Source	Soil	CGI Test	Pressure	Surface	Leak Cause
Mobile Flame Pack	In Building	Main	Dry	Gas %	Low	Lawn	Corrosion
Flame Pack	Near Building	Service	Moist	LEL	Int.	Soil	Outside Force
Visual/Vegetation	In Manhole	Service Tap	Wet	PPM	High	Paved	Construction Defect
Combustible Meter	In Soil	Valve	Saturated	Negative		Other	Material Failure
Odor	In Air	Meter Set					Other
Bar Hole	Other	Tee					

Component & Explanation	Part of System	Pipe and Size	Year Installed	Atmospheric Corrosion Condition
Pipe	Main	Steel		Good
Valve	Service	Cast Iron		Fair
Fitting	Meter Set	Plastic		Bad
Drip	Customer Piping	Other		
Drip Conn.	Other			
Reg. Vent				
Other				

Tested by:
Date:

52


VIDEO
SCA
LEAK SURVEY
TOOLS and EQUIPMENT
53


Review 2
54

Performing Patrol and Leakage Surveys of Gas Distribution Systems

192.721 *Distribution Systems: Patrolling*

(a) The frequency of patrolling mains must be determined by the severity of the conditions which could cause failure or leakage, and the consequent hazards to public safety.

55

Performing Patrol and Leakage Surveys of Gas Distribution Systems

192.721 *Distribution Systems: Patrolling*

(b) Mains in place or structures where anticipated physical movement or external loading could cause failure or leakage must be patrolled—

(1) In business districts, at intervals not exceeding 4½ months, but at least 4 times each calendar year.

(2) Outside business districts, at intervals not exceeding 7½ months, but at least twice each calendar year.

56

Performing Patrol and Leakage Surveys of Gas Distribution Systems

Observing Surface Conditions

- Factors affecting safe operation
  - Excavation, grading, demolition or other construction activity
  - Damage to the pipe
  - Loss of support due to settlement or shifting of soil around the pipe
  - Undermining or damage to pipe supports
  - Loss of pipe cover
  - Excessive fill

57

Performing Patrol and Leakage Surveys of Gas Distribution Systems

Observing Surface Conditions

- Physical deterioration
- Atmospheric corrosion
  - Exposed piping
  - Bridges
  - Pilings
  - Headwalls
  - Casings
  - Foundations

58

Performing Patrol and Leakage Surveys of Gas Distribution Systems

Observing Surface Conditions

- Natural Causes
  - Land subsidence
  - Earth slippage
  - Soil erosion
  - Extensive tree root growth
  - Flooding
  - Climatic condition
- Need for additional pipeline identification and marking
- Damage to casing vents and carrier pipe leakage at cased crossings

59

Performing Patrol and Leakage Surveys of Gas Distribution Systems

Observing Surface Conditions

- Scheduling Patrols
  - Accomplished with leak survey
- Locations or areas that are considered potentially hazardous
  - Should be patrolled frequently
  - Based on probable severity, timing and duration
- Patrol Reports
  - Indicate hazardous conditions
  - Action taken or recommended and the nature of any deficiencies

60

Performing Patrol and Leakage Surveys of Gas Distribution Systems

192.723 *Distribution Systems: Leakage Surveys*

(a) Each operator of a distribution system shall conduct periodic leakage surveys in accordance with this section.

(b) The type and scope of the leakage control program must be determined by the nature of the operations and local conditions, but it must meet the following minimum requirements:

61

Performing Patrol and Leakage Surveys of Gas Distribution Systems

(1) Leakage survey with leak detector equipment must be conducted **in business districts**... at intervals not exceeding 15 months, but at least once each calendar year.

(2) A leakage survey with leak detector equipment must be conducted **outside business districts** as frequently as necessary, but not exceeding 5 years...

However for cathodically unprotected distribution lines subject to 192.465(e) on which electrical surveys are impractical, survey intervals may not exceed 3 years.

62

Performing Patrol and Leakage Surveys of Gas Distribution Systems

Determining the Location of Business Districts

- The principle business areas in an urban community.
- Where the general public regularly congregates.
- Majority of buildings on each side of the street are utilized for commercial, industrial, religious, educational, or recreational purposes.
- Gas facilities are under continuous paving that extends from the center line of the thoroughfare to the building wall or from the main to the building wall.
- Any other location or site, which in the judgment of the operator should be designated.

63

Performing Patrol and Leakage Surveys of Gas Distribution Systems

Minimum Requirements for Performing Leakage Surveys

Business Districts

- Must be conducted with leak detector equipment
- Test of the atmosphere in manholes related to the following:
  - Gas
  - Electric
  - Telephone
  - Sewer
  - Water
- Cracks in pavement and sidewalks
- Other locations providing and opportunity for finding gas leaks

64

Performing Patrol and Leakage Surveys of Gas Distribution Systems

Minimum Requirements for Performing Leakage Surveys

Outside Business Districts

- Must be as frequently as necessary
- Intervals not exceeding 5 years
- Cathodically unprotected lines subject to 192.465(e) on which electrical surveys are impractical, survey intervals may not exceed 3 years.

65

Performing Patrol and Leakage Surveys of Gas Distribution Systems

Factors to Consider When Establishing Frequency

- Piping Systems
  - Age
  - Material
  - Type of Facility
  - Operating Pressure
  - Leak History Records
  - Other studies
- Corrosion
  - Where corrosive environments are known
  - Areas of significant corrosion
  - Cased crossings

66

Performing Patrol and Leakage Surveys of Gas Distribution Systems

Factors to Consider When Establishing Frequency

- Pipe Location
  - Proximity to buildings
  - Type an use of buildings
  - Proximity to the concentration of people
- Environmental Conditions and Construction Activity
  - Weather conditions
  - Wall-to-wall pavement
  - Porous and unstable soil conditions
  - Areas of high construction activity
  - Blasting
  - Large earth moving equipment
  - Heavy traffic
  - Areas subject to earth movement

67

Performing Patrol and Leakage Surveys of Gas Distribution Systems

Factors to Consider When Establishing Frequency

- Other Conditions
  - Earthquake
  - Subsidence
  - Flooding
  - Increase Operating Pressure
  - Extensive growth of tree roots around pipeline facilities

68

Performing Patrol and Leakage Surveys of Gas Distribution Systems

PATROLLING OF PIPELINE SYSTEM

Form 4

COMPANY: _____

Period Covered: Began _____ Ended _____

Areas Covered: _____

Map References: _____

Leakage Indications Discovered (describe locations and indications, such as a condition of vegetation):

Describe any unusual conditions at highway and railroad crossings: _____

Other Factors noted which could affect present or future safety or operations of the gas system:

Follow-up (repairs, maintenance or test resulting from this inspection): _____

Comments: _____

Number of Persons in Patrol Party: _____

Signature of person in charge of patrol party: _____

Date: _____

69

Review III

70

Performing Patrols on Gas Transmission Piping Facilities

192.705 Transmission Lines: Patrolling

(a) Each operator shall have a patrol program to observe surface conditions on and adjacent to the transmission line right-of-way for indications of leaks, construction activity and other factors affecting safety and operation.

(b) The frequency of patrols is determined by the size of the line, the operating pressures, the class location, terrain, weather, and other relevant factors, but intervals between patrols may not be longer than prescribed in the following table.

71

Performing Patrols on Gas Transmission Piping Facilities

192.705 Transmission Lines: Patrolling

Class Location of Line	Maximum Interval Between Patrols	
	At Highway and Railroad Crossings	At All Other Places
1, 2	7½ months; but at least twice each calendar year	15 months; but at least once each calendar year
3	4½ months but at least 4 times each calendar year	7½ months; but at least twice each calendar year
4	4½ months but at least 4 times each calendar year	4½ months but at least 4 times each calendar year

(c) Methods of patrolling include walking, driving, flying or other appropriate means of traversing the right-of-way.

Performing Patrols on Gas Transmission Piping Facilities

Observing Surface Conditions

As required by Pipeline Safety Regulations, 49 CFR 192.705, operators of gas transmission lines shall have a patrol program to observe surface conditions on and adjacent to the transmission line right-of-way for indications of:

- Leaks
- Construction Activity
- Factors Affecting Safety Operation

73

Performing Patrols on Gas Transmission Piping Facilities

Observing Surface Conditions

Leaks (evidence of leaks)

- Audible leaks (hissing sounds)
- Bubbling in a water hole or wet place
- Dead vegetation
- Smell of gas

74

Performing Patrols on Gas Transmission Piping Facilities

Observing Surface Conditions

Construction Activity

- New construction (such as fences, barns, and storage sheds)
- New roads
- New homes
- Encroachments (such as house trailers located on the right-of-way)

75

Performing Patrols on Gas Transmission Piping Facilities

Observing Surface Conditions

Factors Affecting Safety and Operation

- Washouts
- RV and ATV/Snowmobile trails
- Line Exposure
- Ground slippage
- Downed trees on the right-of-way
- Atmospheric corrosion
- Line markers down or missing

76

Performing Patrols on Gas Transmission Piping Facilities

Any new indication of the situations or conditions outlined should be considered abnormal conditions that should be documented on patrolling records.

77

Performing Leakage Surveys on Gas Transmission Piping Facilities

192.706 Transmission Lines Leakage Surveys

Leakage surveys of a transmission line must be conducted at intervals not exceeding 15 months, but at least once each calendar year. However, in the case of a transmission line which transports gas in conformity with192.625 without an odor or ordorant, leakage surveys using leak detector equipment must be conducted.

(a) In class 3 locations, at intervals not exceeding 71/2 months, but at least twice each calendar year; and

(b) In class 4 locations, at intervals not exceeding 41/2 months, but at least four times each calendar year.

78

Performing Leakage Surveys on Gas Transmission Piping Facilities

Classification of Pipeline Location 192.5 Class Location

- **Class 1 Location** A location along a transmission pipeline that has 10 or fewer buildings intended for human occupancy in the equivalent area of one mile along the pipeline, and 220 yards either side of the pipeline, or any offshore area.
- **Class 2 Location** A location along a transmission pipeline that has more than 10 but fewer than 46 buildings intended for human occupancy in the equivalent area of one mile along the pipeline, and 220 yards either side of the pipeline.

79

Performing Leakage Surveys on Gas Transmission Piping Facilities

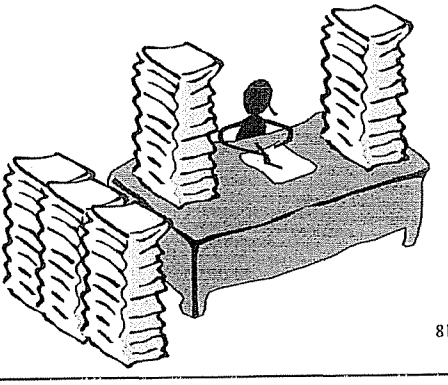
Classification of Pipeline Location 192.5 Class Location

- **Class 3 Location** A location along a transmission pipeline that has 46 or more buildings intended for human occupancy in the equivalent area of one mile along the pipeline, and 220 yards either side of the pipeline, or a pipeline within 100 yards of a public place of assembly (such as a park, playground, church, school etc.) that is occupied by 20 or more persons for 50 days during any 12 month period.
- **Class 4 Location** Any class location where buildings with four or more stories aboveground are prevalent.

80

Documentation of Facility Patrol and Leakage Survey

DON'T FORGET THE *PAPERWORK*



81

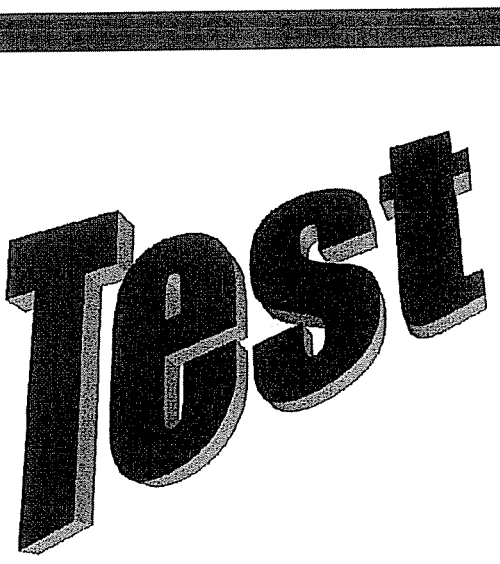
Abnormal Operating Conditions

Recognize	*React*
•Class/leak	•Take action to protect life/property
•Structure built over gas line	•Take action to assure no gas leak/damage to pipeline
•Abnormal stress on pipeline	•Take action to assure no gas leak/damage to pipeline
•Unauthorized taps or vandalism to pipeline	•Take action to protect life/property

82

Review IV

83



84

Qualifying Exam for
OQS M-1 Perform Patrol and Leakage Surveys on Gas Pipeline Facilities

Name (**Please Print**) _____ Date_____

1. The specific gravity of natural gas is approximately _____. (M.1.1.1)

   ( ) a. 1.5
   (X) b. 0.6
   ( ) c. 0.16
   ( ) d. 15

2. The approximate flammability range for gas-in-air concentrations for natural gas is _____. (M.1.1.2)

   ( ) a. 1% to 5%
   ( ) b. 5% to 10%
   (X) c. 5% to 15%
   ( ) d. 3% to 10%

3. L.E.L. for natural gas means _____ is approximately _____ gas-in-air. (M.1.1.3)

   (X) a. lower explosive limit; 5%
   ( ) b. lower explosive limit; 10%
   ( ) c. least explosive layer; 15%
   ( ) d. leanest existing location; 5%

4. A hole that is made in the soil or paving for the specific purpose of testing the subsurface atmosphere with a CGI is a _____. (M.1.1.4)

   ( ) a. detection hole
   ( ) b. CGI outlet
   (X) c. bar hole
   ( ) d. confined space

5. The difference between a Class 2 location and a Class 3 location is that a Class 2 location has _____. (M.1.1.5)

   (X) a. fewer than 46 buildings for human occupancy and public gathering places
   ( ) b. more than 10 buildings for human occupancy
   ( ) c. more than 46 buildings for human occupancy
   ( ) d. 4-story or taller buildings

6. The difference between a Class 3 location and a Class 4 location is _____ (M.1.1.6)

( ) a. public gathering places
( ) b. more than 10 buildings for human occupancy
( ) c. more than 46 buildings for human occupancy
(X) d. the presence of many 4-story or taller buildings

7. A continuous sampling of the atmosphere at or near ground level for buried gas facilities with a gas detector system capable of detecting a concentration of 50 ppm of gas in air at any sampling point is called a _____ survey. (M.1.1.8)

( ) a. subsurface gas detection
( ) b. vegetation
( ) c. ultrasonic leakage
(X) d. surface gas detection

8. Conditions that adversely or limit surface gas detection include excessive wind, soil moisture, snow and _____. (M.1.1.10)

( ) a. loose soils
(X) b. surface sealing by ice
( ) c. vegetation covering
( ) d. tree roots

9. Two-scale CGIs measure gas concentrations as _____. (M.1.1.18)

( ) a. percentage and parts per million
( ) b. parts per million above and below flammable limits
(X) c. percentage of flammable gas in air (percent gas scale) or percent of the lower explosive limit (LEL) scale
( ) d. percentage above and below flammable limits

10. A natural gas concentration of 10,000 ppm is _____ of L.E.L. (M.1.1.21)

(X) a. 1/5
( ) b. 1/10
( ) c. 1/2
( ) d. 4/5

11. When a gas detection instrument is repaired, has a part replaced, registers in a suspicious manner or used for a period of time exceeding one month it should be _____. (M.1.1.22)

( ) a. junked
(X) b. calibrated
( ) c. considered unreliable
( ) d. considered "broken in"

12. A classification of leaks that represents existing or probable hazards to persons or property, and requires immediate repair or continuous action until the conditions are no longer hazardous is _____. (M.1.1.23)

(X) a. Class 1
( ) b. Class 2
( ) c. Class 3
( ) d. Class 4

13. A leak that is non-hazardous at the time of detection and can be reasonably expected to remain non-hazardous is classified as _____. (M.1.1.24)

( ) a. Class 1
( ) b. Class 2
(X) c. Class 3
( ) d. Class 4

14. Special one-time surveys are conducted when pipelines have been exposed to unusual stresses such as _____. (M.1.2.4)

( ) a. corrosion
( ) b. cold weather
( ) c. hot weather
(X) d. earthquakes

15. Evidence of earthquake activity, landslide, excavation, irregular vegetative growth, recent construction activity, and vandalism are all _____. (M.1.3.3)

( ) a. typical results of urban growth
(X) b. abnormal conditions that should be documented during patrolling
( ) c. natural or man-made occurrences that can be expected
( ) d. not typically factors for pipeline operations or safety

8-Hour Leak Investigation Class

July 2011

First Response/Gas Leak
Gas Leak Investigation

Ron Six, Instructor
Senior Utility Consultant
AEGIS Insurance Services, Inc.

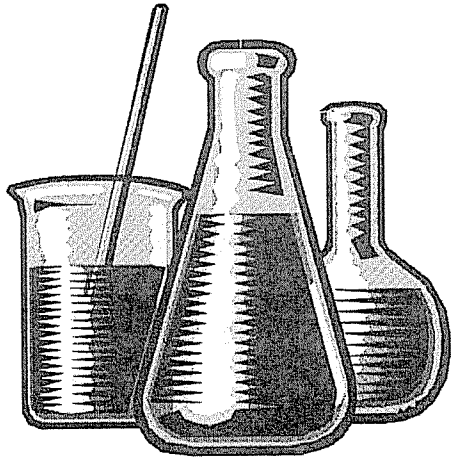
201/417-2487

This material is intended for basic gas utility operator safety training or refresher training only, and is designed to accompany a formal classroom-style presentation. It is important to supplement the material with your company's specific policies and procedures.

Any company choosing to use this material as a training tool accepts ultimate responsibility for the qualifications of its own employees. Use of this material signifies your company's acceptance of it as appropriate for company training needs, and acknowledges that this material must be supplemented with company-specific policy and procedural instruction. Specific practices and procedures covered in this material are intended only as examples. AEGIS does not endorse any particular practice, procedure or item of equipment described or shown and specifically disclaims any warranty of merchantability or fitness for a particular use.

Characteristics of Natural Gas

- Non-toxic
- Colorless
- Odorless
- Specific gravity
- Combustible range



AEGIS

Physical Properties of Various Explosive Liquids and Gases

Material	Chemical Formula	Specific Gravity Air=1	Ignition Temp Deg. F in Air	Lower Expl. Limit (% gas)	Upper Expl. Limit (% gas)
Methane	CH_4	.55	1193	5.3	15.0
Natural Gas	Blend	.65	950-1200	5.0	15.0
Ethane	C_2H_6	1.04	993-1101	3.0	12.5
Propane	C_3H_8	1.56	957-1090	2.2	9.5
Butane	C_4H_{10}	2.01	912-1056	1.9	8.5
Hexane	C_6H_{14}	3.0	437	1.1	7.5
Gasoline	Blend	3-4.0	632	1.4	7.6
Acetone	C_3H_6O	2.0	869	2.5	12.8
Benzene	C_6H_6	2.8	928	1.2	7.8
Carbon Monoxide	CO	1.0	1128	12.5	74.0
Hydrogen	H_2	.1	932	4.0	75.0
Hydrogen Sulfide	H_2S	1.2	500	4.0	44.0

AEGIS

The Dangers of Gasoline

One Gallon of Gasoline

Energy equivalent to 8 sticks of dynamite

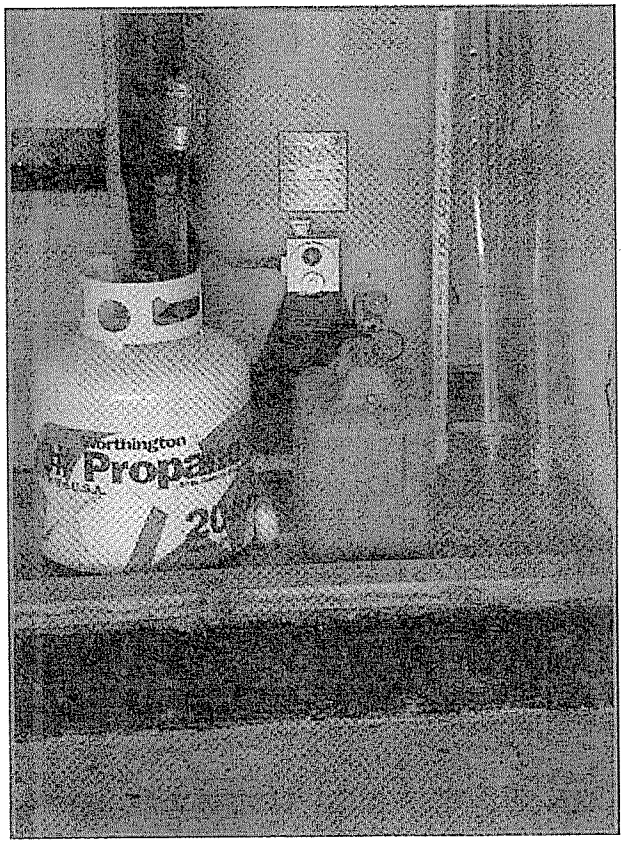
The Dangers of Gasoline

- Nearly 150,000 fires occurring in the United States every year are caused by gasoline.
- On average 500 Americans die every year in gasoline related fires.
- Almost half a billion dollars in property damage can be linked to gasoline annually.

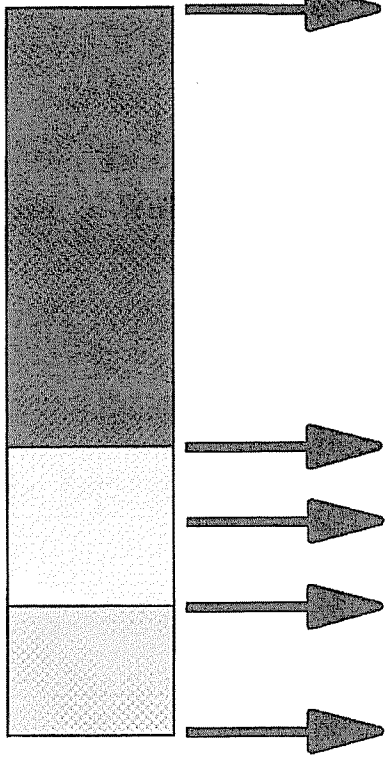
*National Fire Protection Association (NFPA)

Sources of Combustible Vapors

- Natural gas -
  - Methane, Ethane
- Heavy hydrocarbons -
  - Gasoline, Propane, Butane
- Soil and landfill gas -
  - Methane, CO_2
- Gases in sewers -
  - Solvents, Alcohols
- Sewer gas -
  - Methane, CO_2, H_2S



Flammable Range for Natural Gas



100% Gas

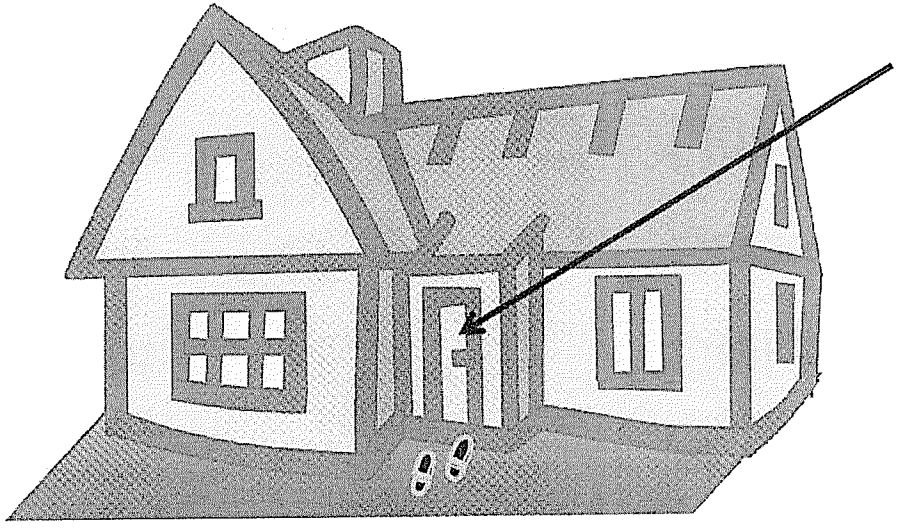
15.0% Gas (U.E.L.)

10% Gas (Optimum)

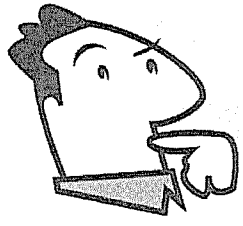
5.0% Gas (L.E.L.)

0% Gas

AEGIS



1% Gas In Air

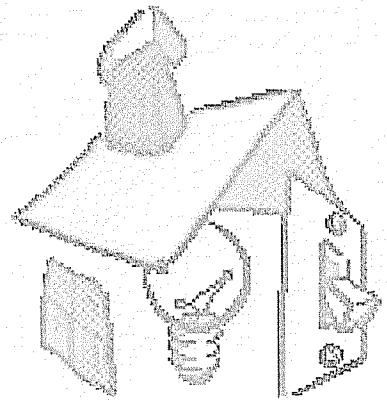


You arrive and get a 20% LEL (1% Gas/Air reading) in the atmosphere, just as you enter the front door.

What would you do?

Potential Ignition Sources

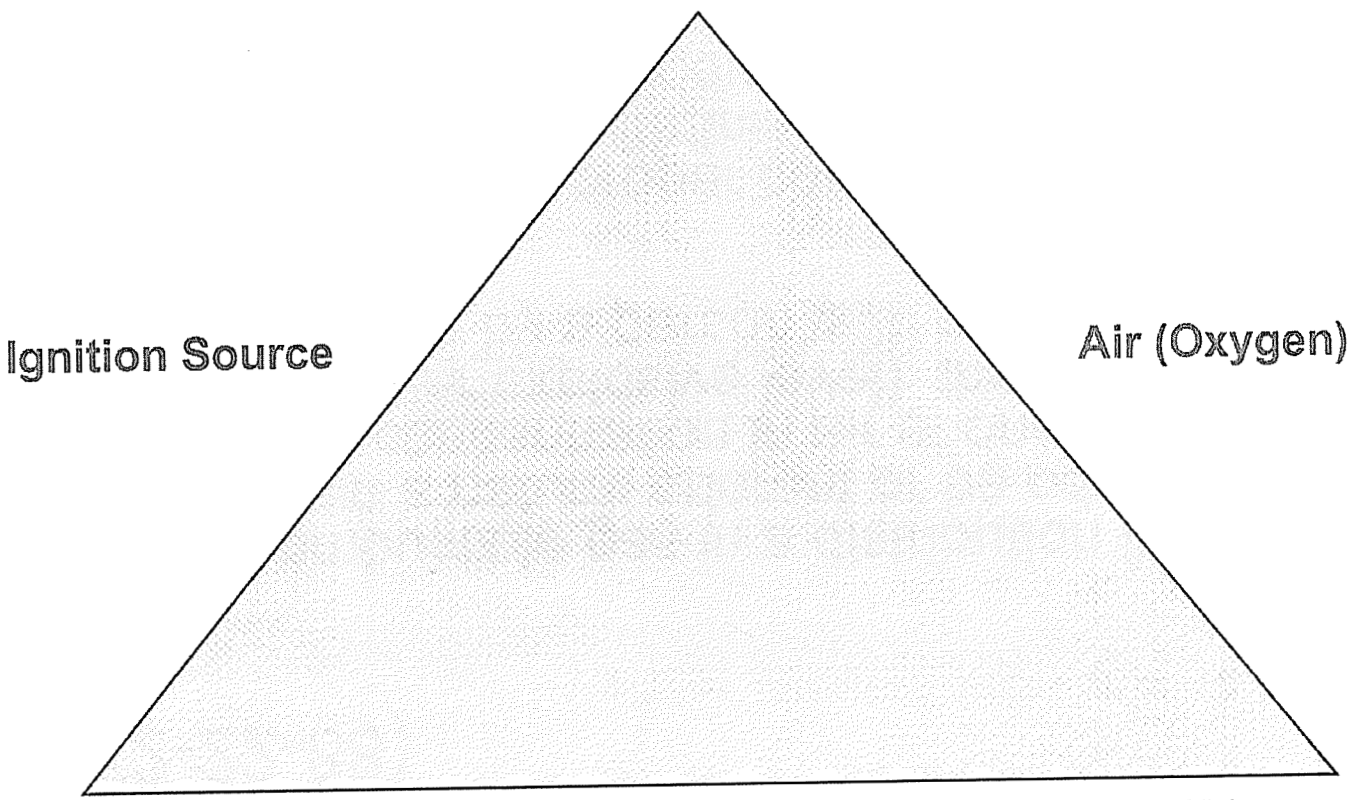
- Doorbell
- Light Switch
- Pilot Light
- Flashlight
- Telephone
- Electrical appliance
- Automobile



- Security system
- Matches, lighter
- Cell phone/pager
- Back-up generator
- Lightning
- Static electricity
- And many others

AEGIS

The Explosion Triangle



AEGIS

Federal Odorization Standard 192.625 (2-22-88)

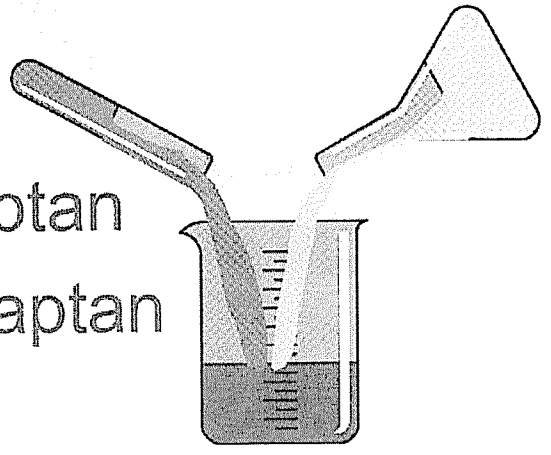
(a) A combustible gas in a distribution line must contain a natural odorant or be odorized so that at concentration in air of one-fifth of the LEL (lower explosive level), the gas is readily detectable by a person with a normal sense of smell.

(f) To assure the proper concentration of odorant in accordance with this section, each operator must conduct periodic sampling of combustible gases using an instrument capable of determining the percentage of gas in air at which the odor becomes readily detectable.

Odorant is the customer's leak detector.

Odorant Components

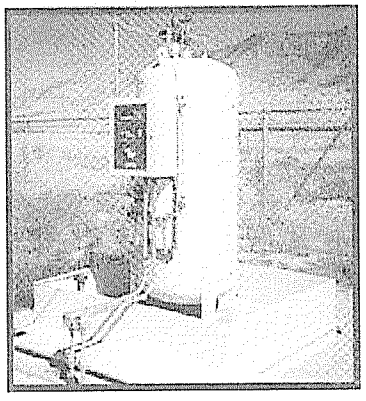
EM	Ethyl Mercaptan
DMS	Dimethyl Sulfide
IPM	Isopropyl Mercaptan
TBM	Tertiary Butyl Mercaptan
NPM	Normal Propyl Mercaptan
MES	Methyl Ethyl Sulfide
SBM	Secondary Butyl Mercaptan
THT	Thiophane



AEGIS

Factors Which Affect Odorant Quantity

- Odorizer shut-down
- Contaminants in odorizer
- Naturally occurring sulfurs
- Distillates in pipeline
- Pipewall adsorption
- Oxidation in pipeline
- Soil adsorption



AEGIS

Factors Which Affect Odorant Quality

Physical ailments

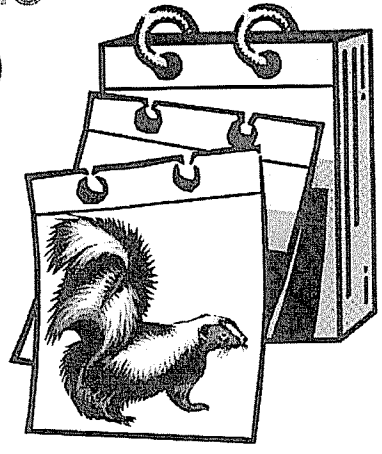
Age

Masking

Distraction

AEGIS

Odorization must be continuous (every day)



and it must be adequately documented!

AEGIS

Incident (2000)

Company Retention $200K

- While parking the family car in his attached garage, a retired 83 year-old physician lost control of his automobile and struck the concrete block foundation that supported and elevated his home's heating and hot water equipment.
- The impact moved the boiler about one foot from its original position. The damage was severe enough to warrant an inspection, so the doctor called his regular plumbing and heating service provider who agreed to check the unit that afternoon.
- The doctor then called the local gas company and explained what had happened.

Incident (2000) Cont'd.

Company Retention $200K

Cont'd.

- He was asked whether he smelled gas. He answered that he did not. The company's call center representative then explained that the company would not examine the damage unless he smelled gas, but if he did, he should please call back and they would gladly send someone out to his home.
- 90 minutes later the home exploded and the doctor and his wife were severely burned. Less than one month later, suffering from severe burns over most of his body, the doctor died.

AEGIS Incurred $2.7 Million

AEGIS

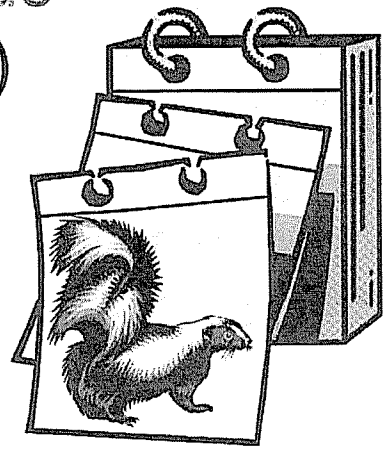
What Happened?

- At times, customers and the general public seek assistance from gas utilities for situations that are not commonly encountered. Such was the case in this unusual incident. The call center representative did not recognize the potential severity of a situation involving an automobile striking the heating equipment.
- Listening to callers and their circumstances is critical to effectively achieve the ultimate goal of emergency response and the protection of life and property.
- The doctor, being 83 years old may have lost much of his sense of smell with age.

The call center is the "First Line of Defense"

AEGIS

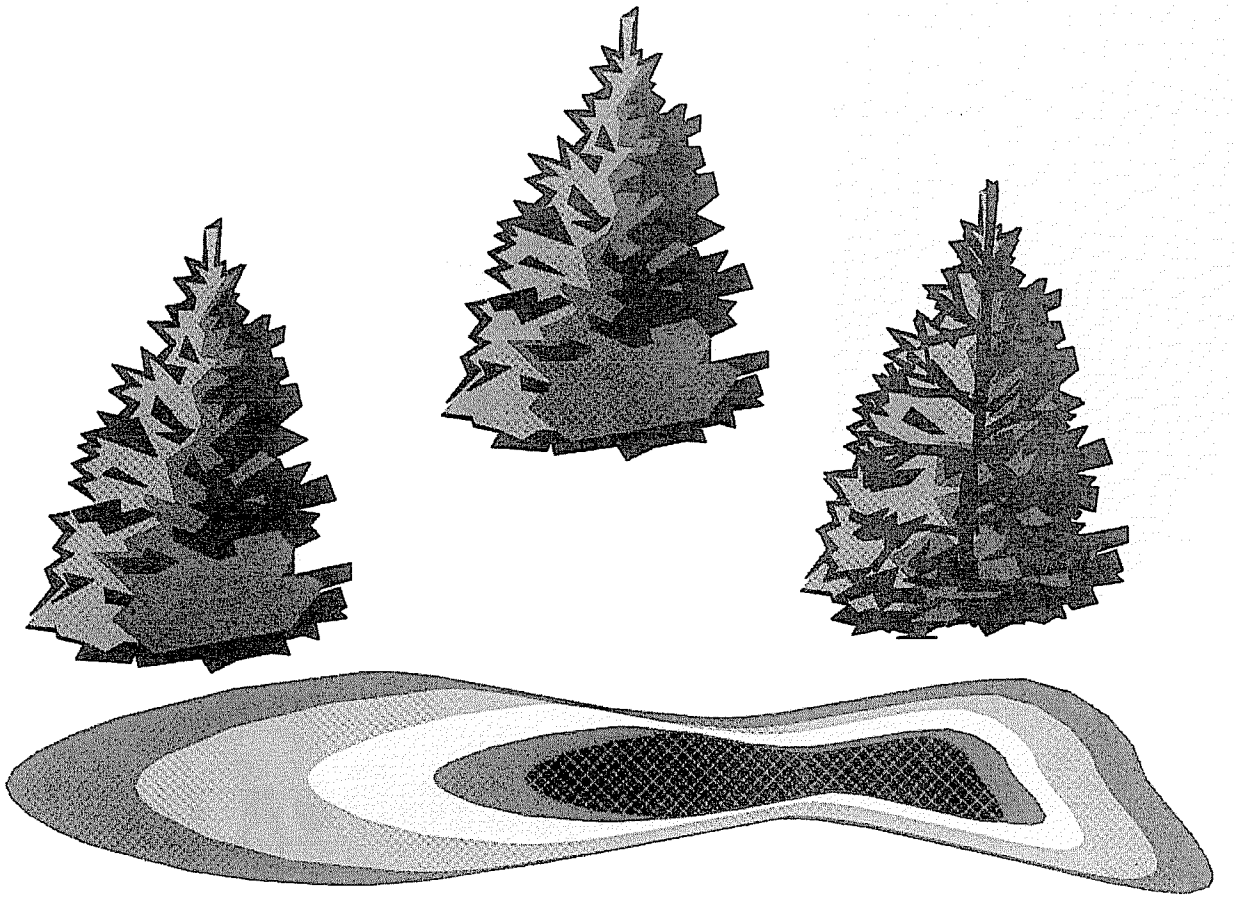
Odorization must be continuous (every day)



and it must be adequately documented!

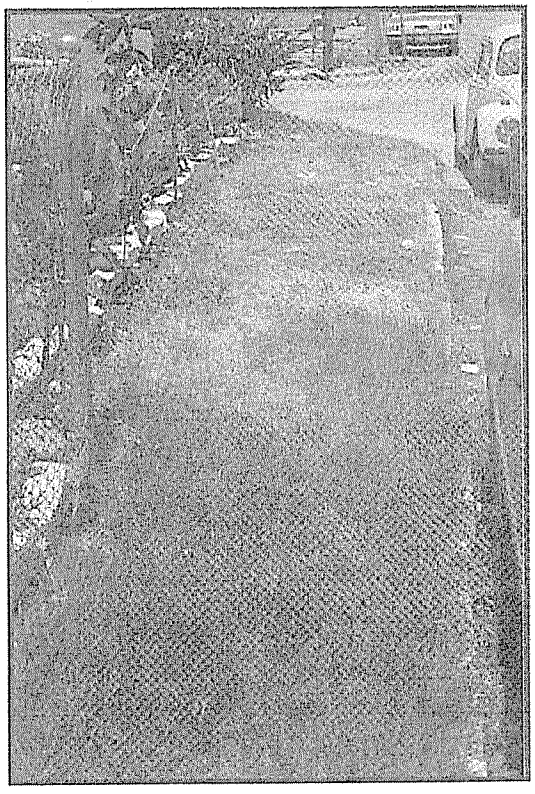
AEGIS

Effects of Natural Gas on Soil and Vegetation



Effects of Natural Gas on Soil and Vegetation

- Displaces soil atmosphere
- Drying effect
- Eliminates aerobic bacteria
- Reduces soil components
- Changes pH



AEGIS

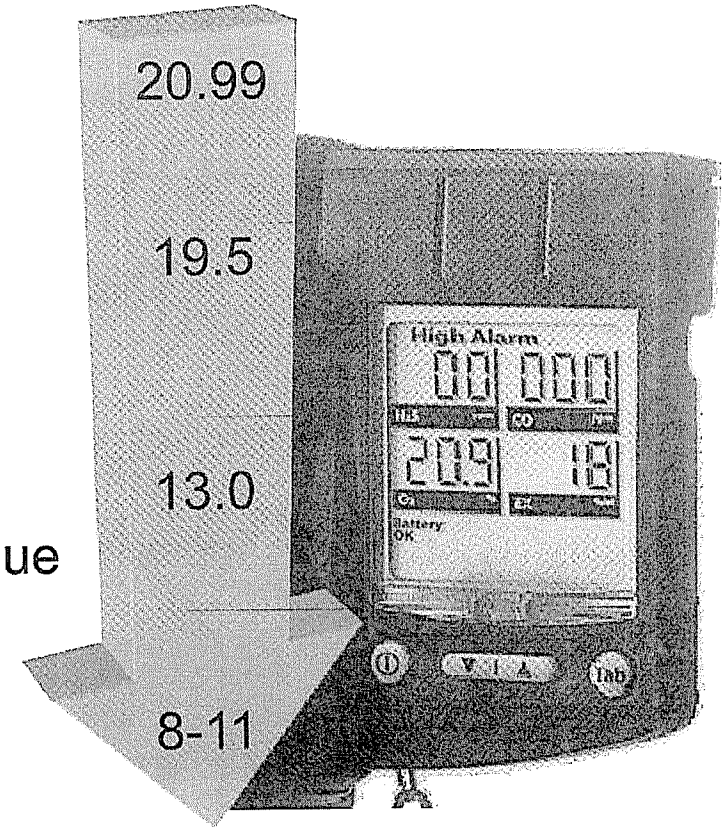
Oxygen Deficiency

Normal air supply

OSHA minimum limit for work without supplied oxygen

Acetylene flame extinguished, work difficult, increased breath rate, lips and fingernails turn blue

Loss of consciousness, death results if oxygen not restored



AEGIS

The Athens, Ohio Incident

- Don't become complacent
- Don't "ASSUME" anything
- Don't take natural gas for granted
- Don't catch the "Find & Fix Syndrome"
- Follow procedures

Remember your main job is "Public Safety"

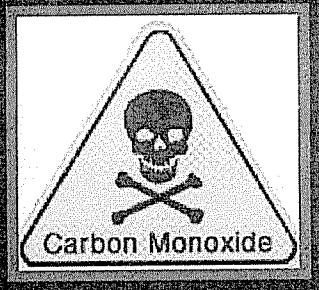
and you are also part of the Public.

- Natural gas is a simple asphyxiant
- Carbon monoxide is a chemical asphyxiant

It takes far less CO to be deadly!

Carbon Monoxide

- Odorless
- Colorless and tasteless
- Product of incomplete combustion
- Deadly in very small amounts



AEGIS

Potential Effects of Carbon Monoxide Exposure

Excerpts from OSHA chart based on industrial use

PPM	Effects & Symptoms	Time
50	Permissible exposure level	8 Hrs.
200	Slight headache	3 Hrs.
400-600	Headache, discomfort	1-2 Hrs.
1000-2000	Headache, confusion, nausea, may stagger	1.5 Hrs.
2000-2500	Heart palpitation	30 Mins.
2500-3500	Unconsciousness	30 Mins.
4000	Fatal	30 Mins.

Effects may vary from person to person!

AEGIS

CO & Small Gasoline Engines

In 2006, 65 people died due to Carbon Monoxide poisoning from gasoline powered generators.

*A single generator can emit several hundred times more poisonous Carbon Monoxide than the exhaust from a modern car.

*National Institute of Standards and Technology (NIST)

Lessons Learned from CO

A farmer died of CO poisoning while using an 11 horsepower gasoline-powered pressure washer to clean his barn. He had worked about 30 minutes before being overcome.

AEGIS

Carbon Monoxide Detection Portable Instruments

- What readings constitute a hazard?
- What if it reads 0 ppm?
- OSHA vs. ASHRAE
- Atmospheric testing
- Stack testing
- Background readings and other gases

AEGIS

Major Causes of Leaks

- Corrosion
- Mechanical failure
- Improper installation
- Improper design
- Faulty materials
- Outside damage - "Dig-Ins"

AEGIS

- In the last 20 years, over 30% of natural gas-related incidents/explosions have been a direct result of "dig-ins" or outside damage!
- This is the major reason why we should always promote the "Call Before You Dig Program."

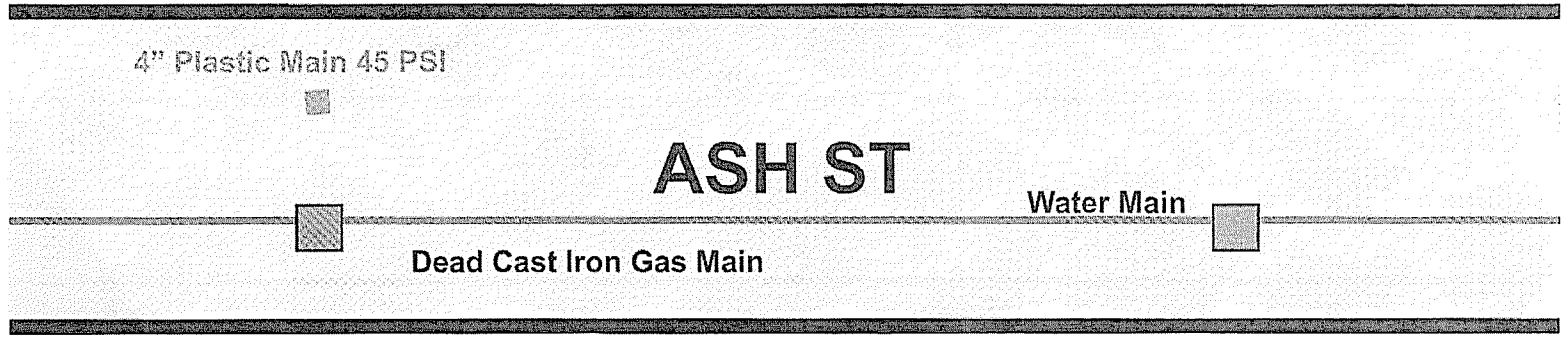
811®

Know what's below.
Call before you dig.

AEGIS

#682

#686



AEGIS

Our main job is *not*
finding & fixing leaks

Our main job is
public safety

AEGIS

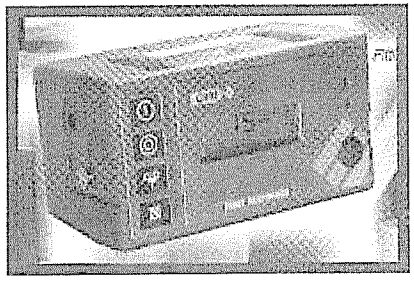
Instruments For Detecting Gas Leaks

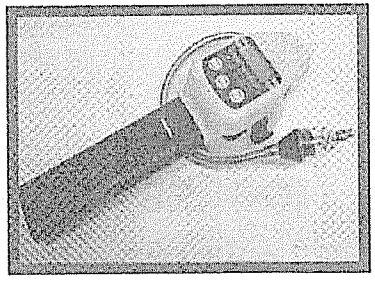
The Combustible Gas Indicator

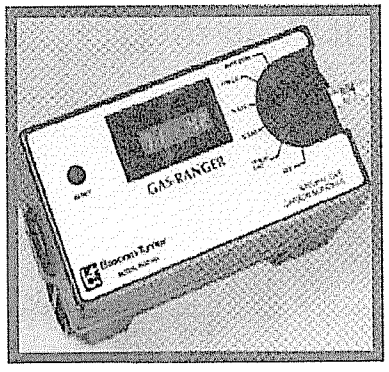
- CGI should be used to:
  - Classify an atmosphere
    - Inside a building or in a confined space
  - Classify underground leakage
    - Determine "Where is the gas?"
  - Pinpoint underground leakage
    - Determine "Where is the leak?"
- You must know:
    - How to properly use it
    - What readings might constitute a hazardous condition

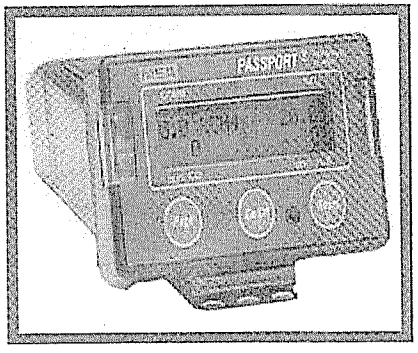
Combustible Gas Indicators (CGI)

- GMI Gas Surveyor
- J&N Sensit Gold
- Bascom-Turner Ranger
- MSA Passport
- And others



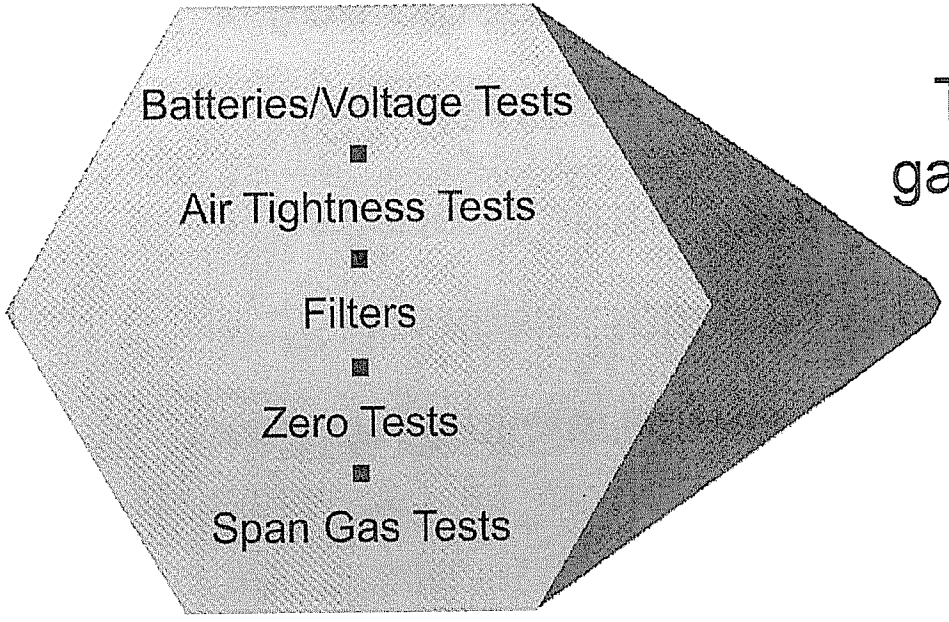






AEGIS

Proper Operation and Maintenance of CGIs

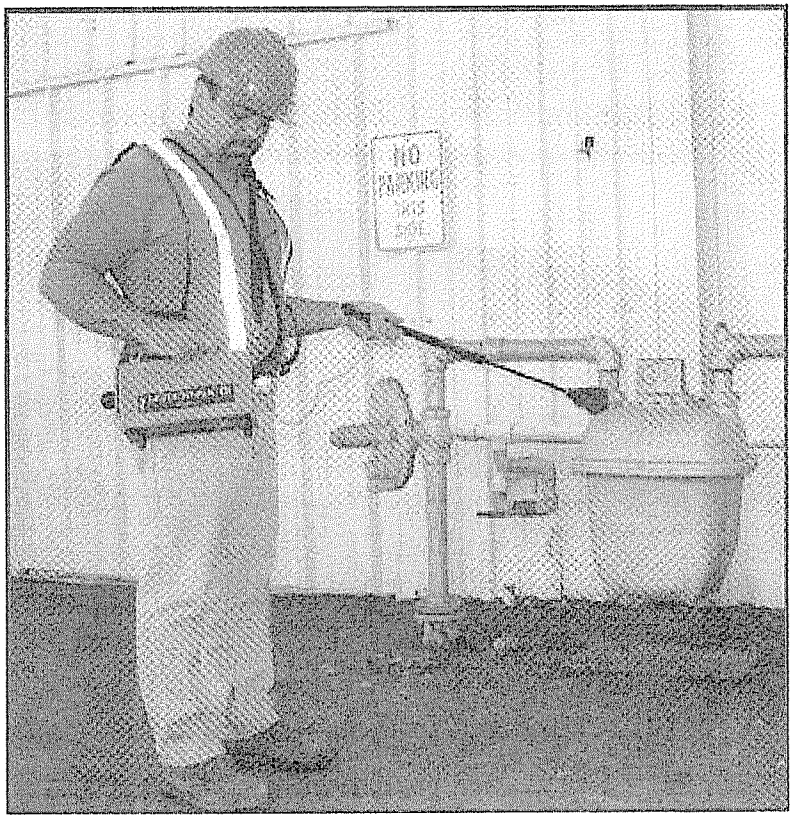


Treat your combustible gas indicator with respect.

It could save your life someday!

Hydrogen Flame Ionization (HFI)

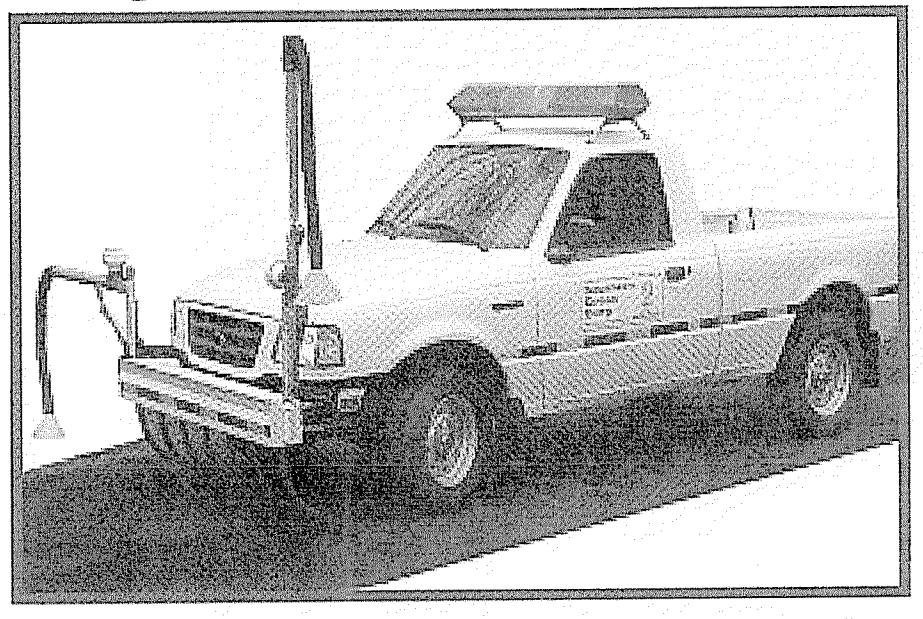
- A search instrument
- Underground leaks must be confirmed with CGI test
- Above ground leaks must be confirmed with leak detecting solution
- Venting conditions



Mobile Survey Equipment

HFI

- Wind
- Ground moisture
- Venting conditions
- Speed of travel

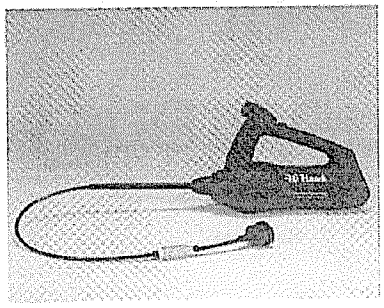


OMD

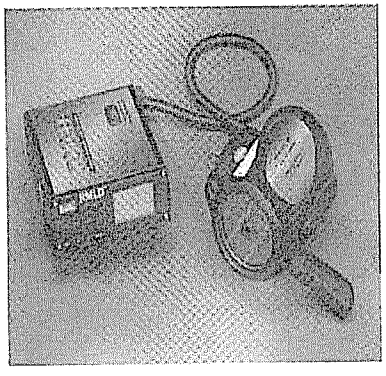
AEGIS

Surface Sampling Laser Leak Detectors

- Heath Detecto Pak-Infrared (DP-IR)



- Southern Cross '46 Hawk



- Heath Remote Methane Leak Detector (RMLD)

AEGIS

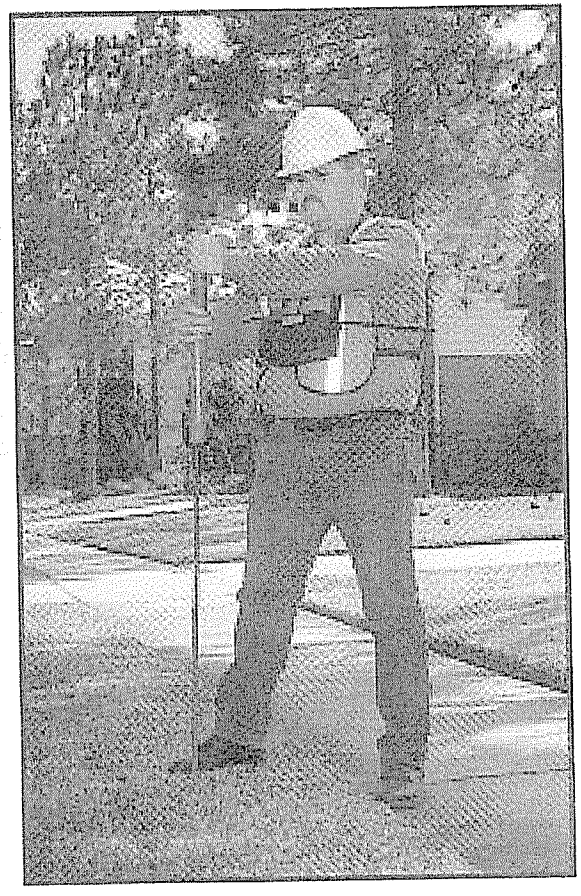
1 Part Per Million (PPM)

One Penny
in
Ten Thousand
Dollars

AEGIS

Surface Sampling Indications Must Be Confirmed

- No matter the degree of sophistication, all surface sample (HFI) indications must be confirmed and classified with CGI and probe bar.



AEGIS

Proper Maintenance of HFI Instruments

- Filters, check/change
- Maintain checks on fuel (60/40)
- Batteries must be maintained
- Air tightness/span gas tests
- Be careful in adverse weather conditions
- Shutting off/cooling down

Instrument Calibration

- Technician must be trained
- Sample delivery system suited for the instrument
- Gases must be certified
- Certain gases (CO & H_2S) have a shelf life/check date
- Documentation/separate form for each instrument

AEGIS

Combustion Chamber Demonstration

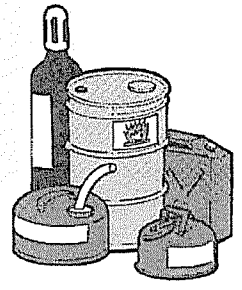
Lessons Learned:

- Natural gas is lighter than air
- Flame wave moves up-over-down
- Pressure wave moves upward first
- The optimum mixture (10%) creates the most efficient burning
- The greatest forces are created when there is a low point of ignition
- The two major by-products of the combustion process are carbon dioxide (CO_2) and water vapor (H_2O)

AEGIS

Relative damage in a natural gas-related incident is related to:

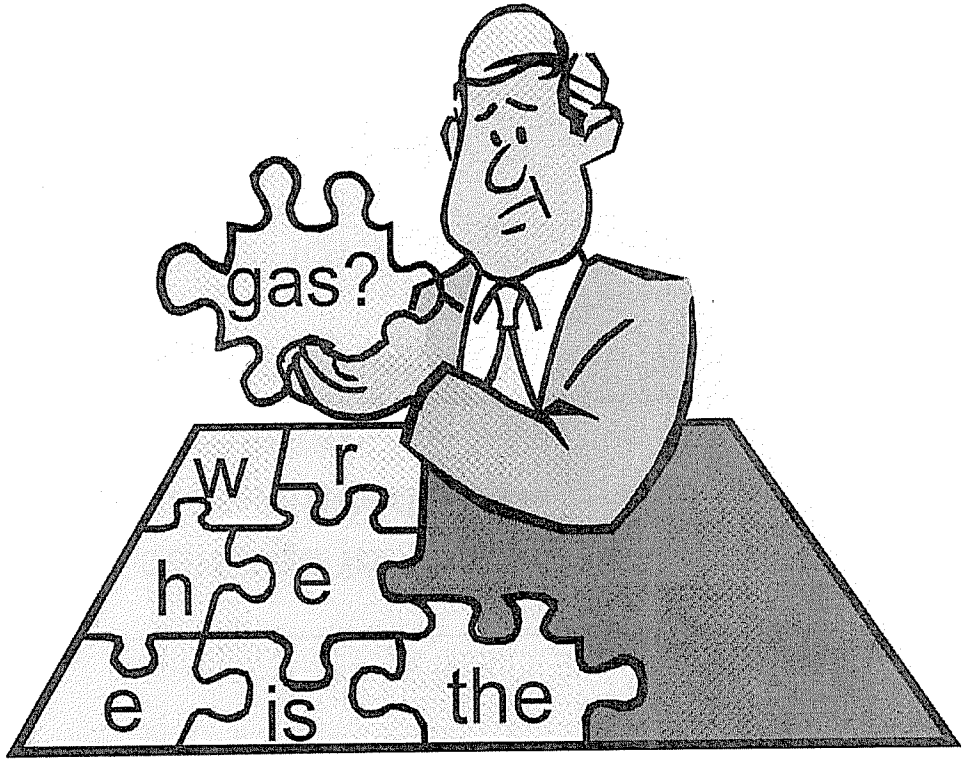
- Point of ignition-vertically
- Point of ignition-horizontally
- Source of ignition
- Type of leak=volume of gas
- Type/structure of building
- Other combustibles in area



AEGIS

Evaluating The Leak

Where is the gas?



AEGIS

Evaluating The Leak

- Where is the gas?
- How much is there?
- Extent of hazard (migration)
- Relation to other structures
- Evaluate/evacuate

AEGIS

HAZARD

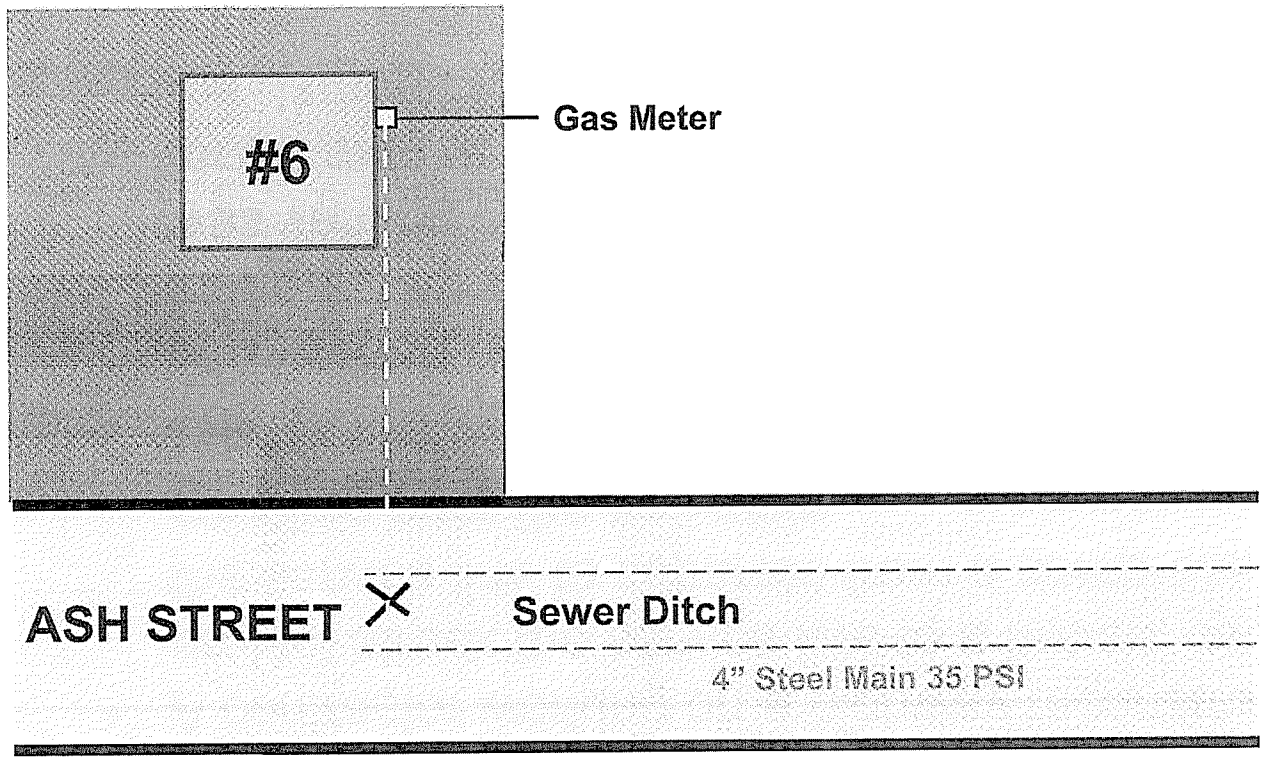
EXTENT

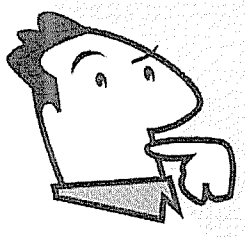
LIFE

PROPERTY

AEGIS

Figure # 1





A contractor has snagged the 1" steel service and bowed it in the ditch. A small hole was made in the line and gas is blowing in the ditch.

What would be your actions?

AEGIS

Incident (1998)
Company Retention $5M

- A contractor working on a highway reconstruction project struck the service line to a house, causing the service line to separate from a compression coupling near the gas main.
- The gas company was called at 11:15 am; a serviceman arrived on the scene at 11:45 and immediately called for a crew. Thinking the gas was venting out into the street, he sat in his truck for 20 minutes until the crew arrived. Although the damage location was only 32 feet from the incident site, no attempt was made to check nearby buildings with a combustible gas indicator for the presence of migrating gas.

What Happened?

- First Responder failed to recognize the gravity of the situation and made the assumption that the pulled line was leaking in only one place.
  - The First Responder's main job on a reported gas leak is to determine "Where is the gas?" and "Is it affecting people or property?" The appropriate way of determining this is with a combustible gas indicator (CGI) – Test Don't Guess!
- Our first priority must always be focused on

Public Safety

AEGIS

Incident (1998)
Company Retention $5M

Cont'd.

- The leaking gas migrated to the house where an explosion occurred killing an elderly woman and severely burning 3 children, the explosion occurred at 1:00 pm. The children received burns to over 45% of their bodies with most of the burns occurring in the facial areas.
- In the settlement the contractor also paid more than $15,000,000.00 in claims.

AEGIS Incurred $15 Million

Factors Affecting Gas Migration

- Soil type
- Soil moisture
- Surface cover/frost
- Line pressure
- Depth of burial
- Leak size and age
- Change in elevation=slope
- Path of least resistance

AEGIS

Remember:

- The biggest built-in safety factor of natural gas is that it is lighter than air; however…

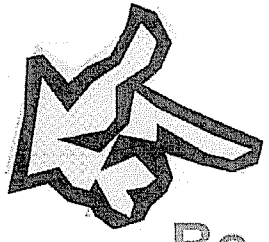
  it will vent to the atmosphere someplace!

AEGIS

"Centering" = Where is the Gas?

Centering The Leak

- Probe holes must be of sufficient depth
- Test all available openings
- "Zero out" N-S-E-W
- You must have sufficient information to make a good judgement



Be Careful – "Don't make a leak, looking for a leak."

AEGIS

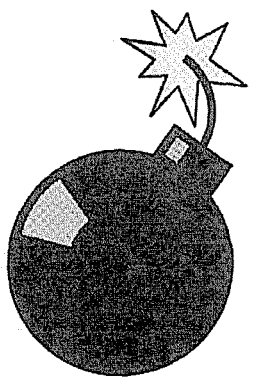
GPTC Guidelines

Leak Classification

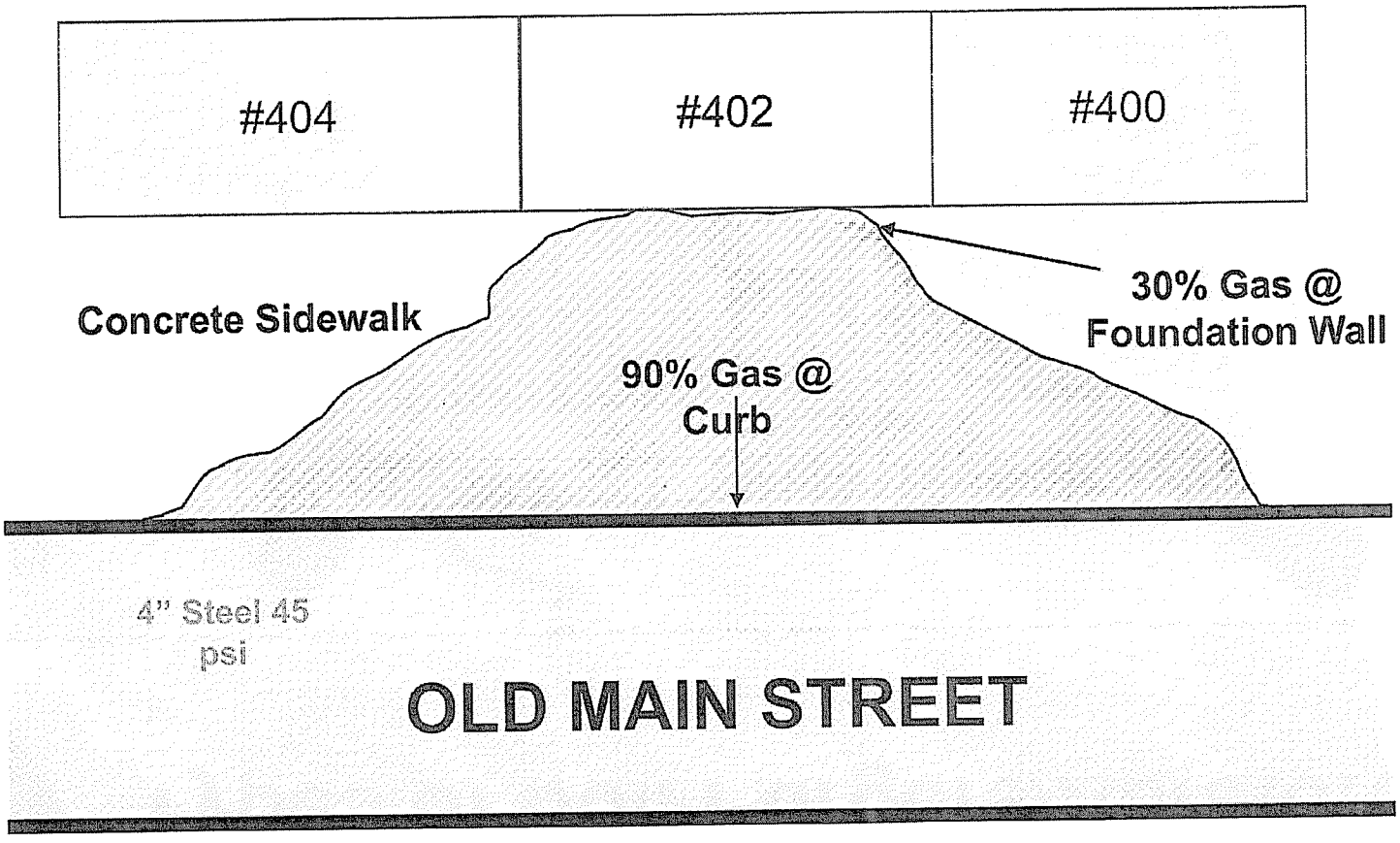
- The following establishes a criteria by which leakage indications of flammable gas can be graded and controlled. When evaluating any gas leak indication, the initial step is to determine the perimeter of the leak area. When this perimeter extends to a building wall, the investigation should continue into the building.

GPTC Guidelines
Class 1 Definition

- A leak that represents an existing or probable hazard to persons or property, and requires immediate repair or continuous action until the conditions are no longer hazardous.

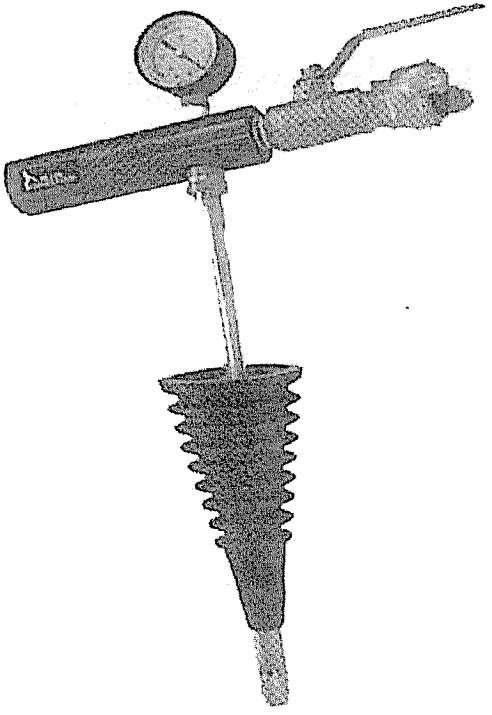


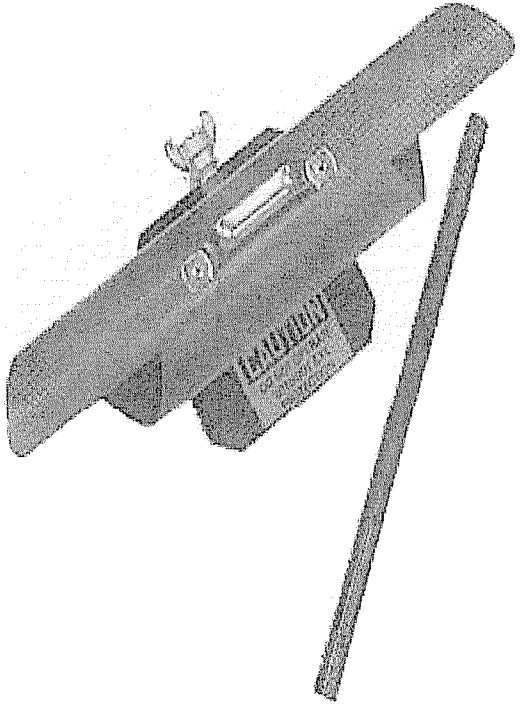
AEGIS


#404
#402
#400
Concrete Sidewalk
30% Gas @
Foundation Wall
90% Gas @
Curb
4" Steel 45
psi
OLD MAIN STREET

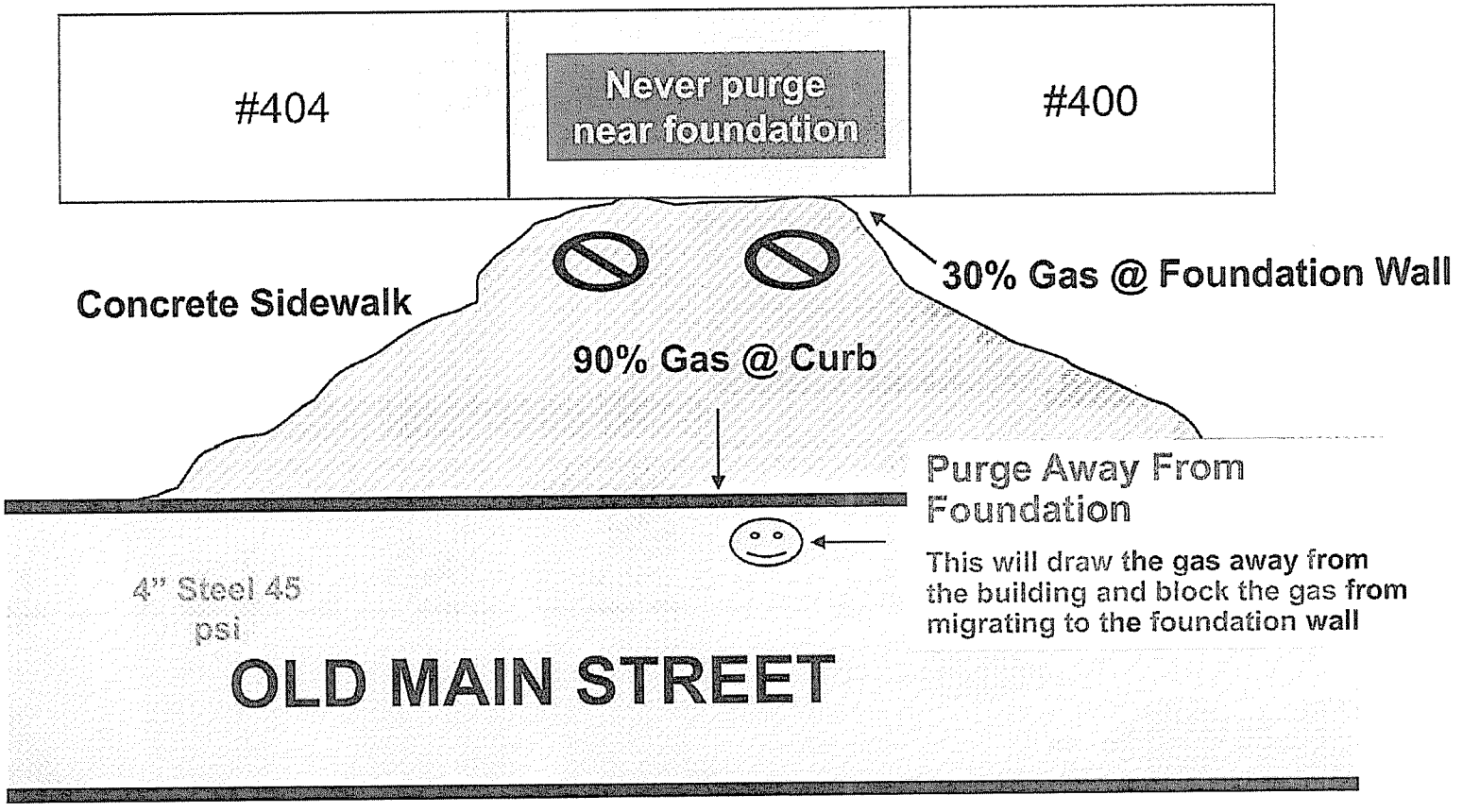
AEGIS

Types of Soil Purgers/Aerators





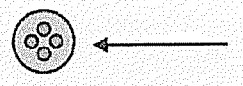
AEGIS


#404
Never purge near foundation
#400
Concrete Sidewalk
30% Gas @ Foundation Wall
90% Gas @ Curb
Purge Away From Foundation
This will draw the gas away from the building and block the gas from migrating to the foundation wall
4" Steel 45 psi
OLD MAIN STREET

AEGIS

CURB LINE

ASH STREET



20% Gas In Sewer Manhole

6" Steel UP

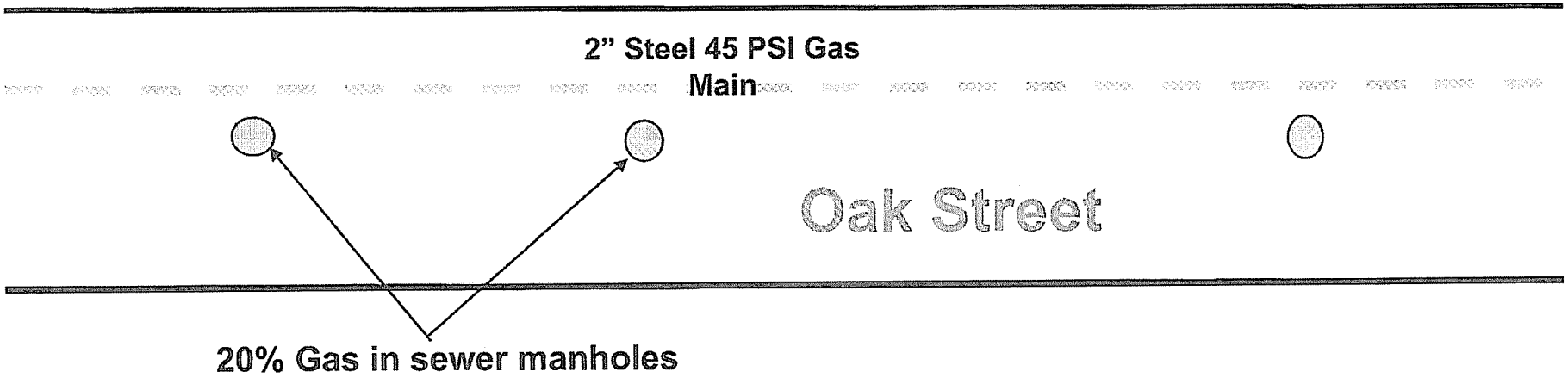
Resident calls @ 3:34 pm Gas odor

46

50

54

First Responder smells a very strong odor of gas in the area as he arrives (4:05 pm). Checks sewer manholes in the street and finds 20% gas in each manhole. Calls for a crew.

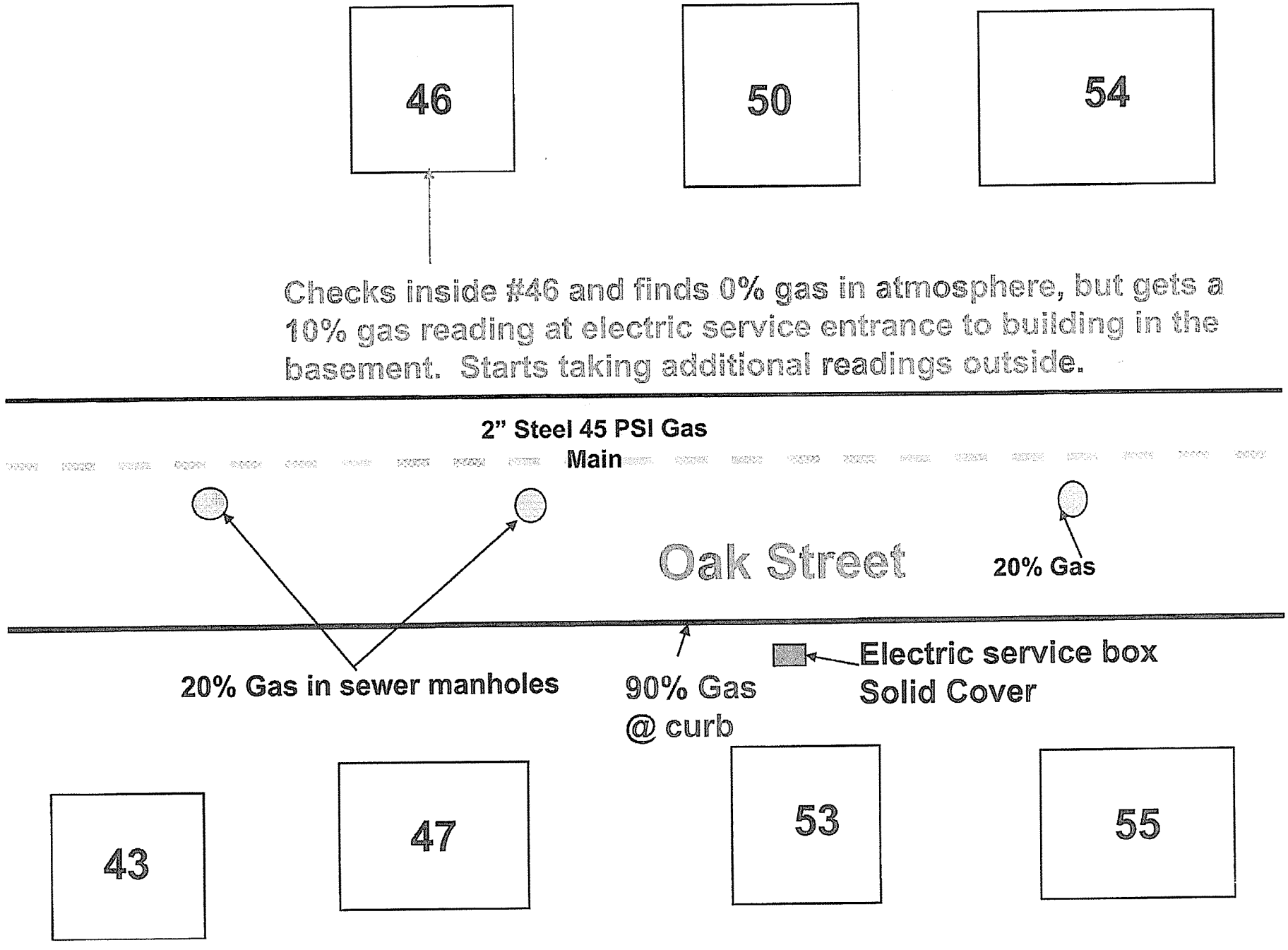


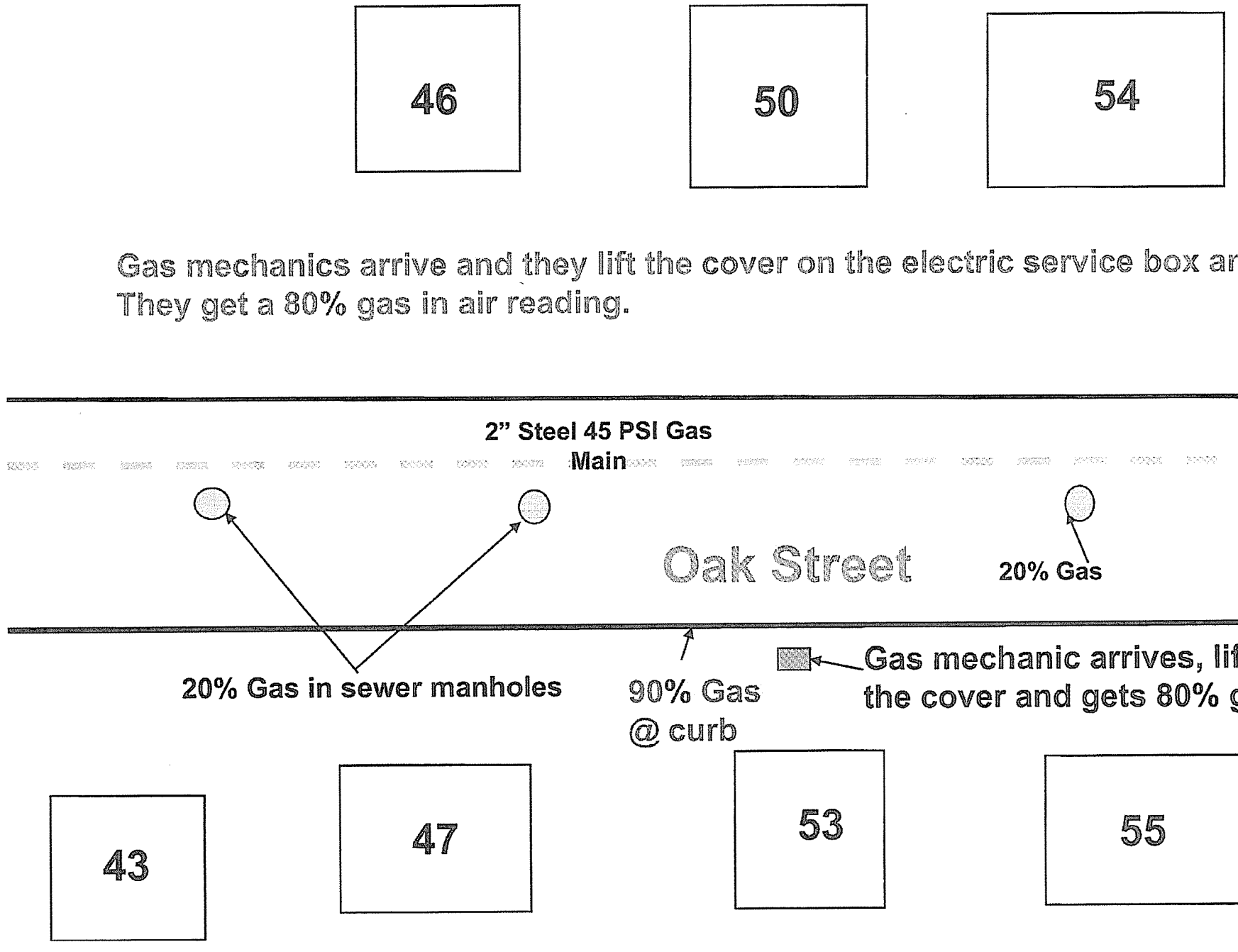
43

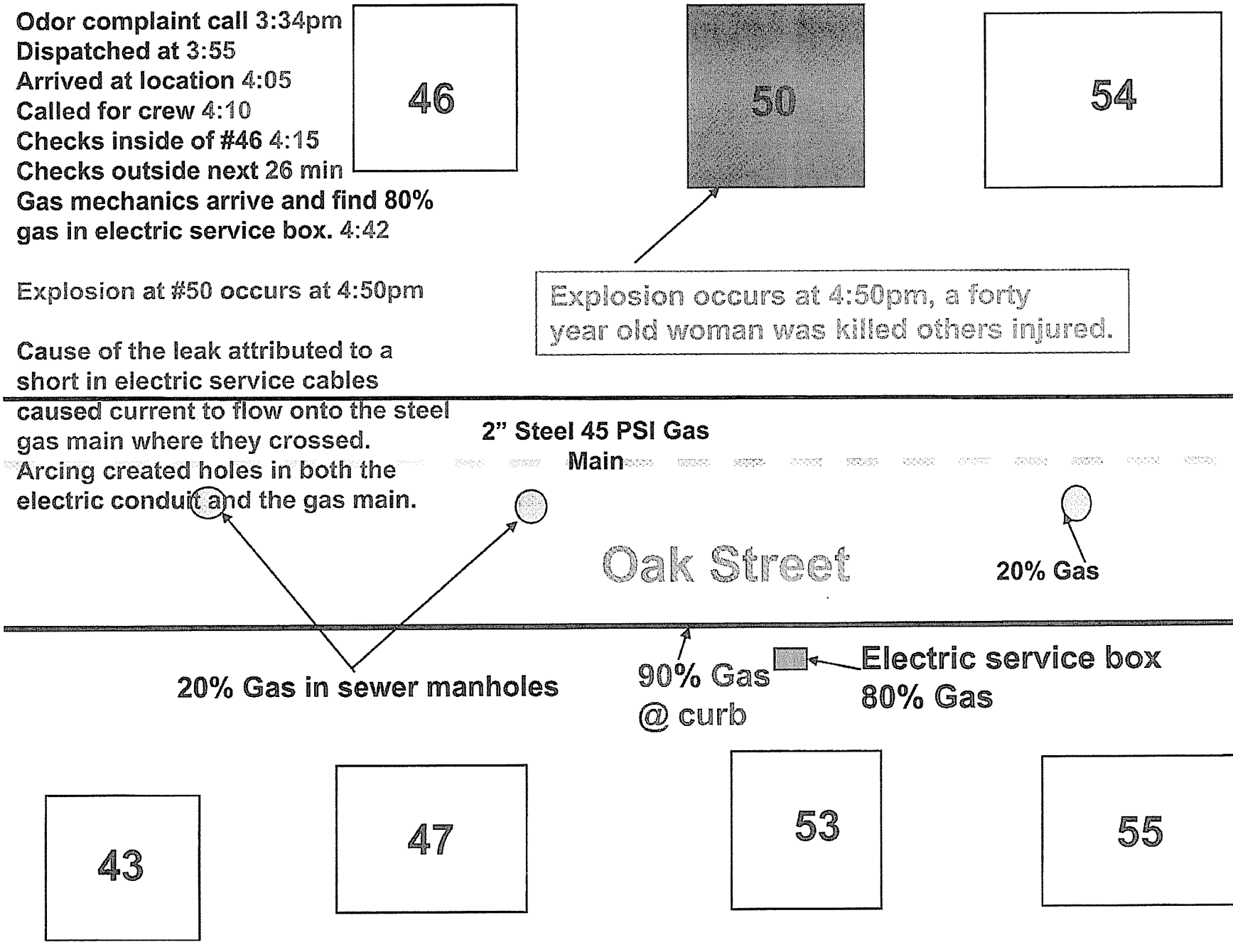
47

53

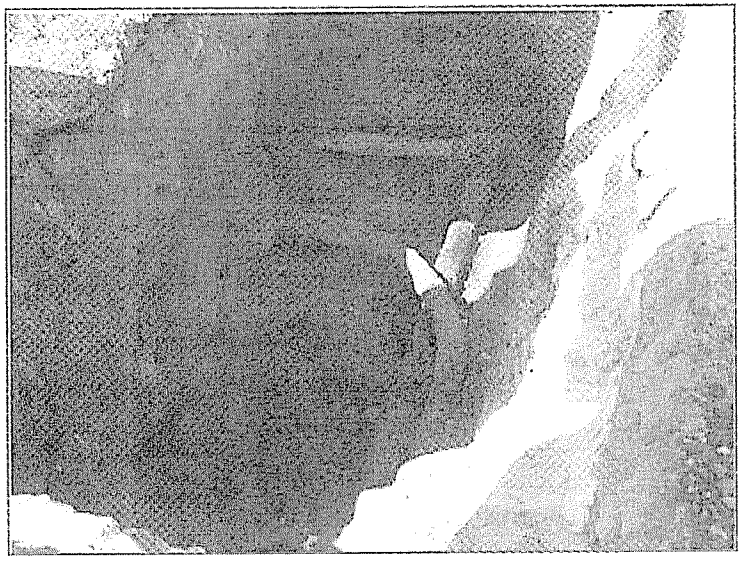
55


46
50
54
Checks inside #46 and finds 0% gas in atmosphere, but gets a 10% gas reading at electric service entrance to building in the basement. Starts taking additional readings outside.
2" Steel 45 PSI Gas Main
Oak Street
20% Gas
20% Gas in sewer manholes
90% Gas @ curb
Electric service box Solid Cover
43
47
53
55


46
50
54
Gas mechanics arrive and they lift the cover on the electric service box and
They get a 80% gas in air reading.
2" Steel 45 PSI Gas
Main
Oak Street
20% Gas
20% Gas in sewer manholes
90% Gas
@ curb
Gas mechanic arrives, lifts
the cover and gets 80% gas.
43
47
53
55


Odor complaint call 3:34pm
Dispatched at 3:55
Arrived at location 4:05
Called for crew 4:10
Checks inside of #46 4:15
Checks outside next 26 min
Gas mechanics arrive and find 80% gas in electric service box. 4:42
Explosion at #50 occurs at 4:50pm
Cause of the leak attributed to a short in electric service cables caused current to flow onto the steel gas main where they crossed. Arcing created holes in both the electric conduit and the gas main.
46
50
54
Explosion occurs at 4:50pm, a forty year old woman was killed others injured.
2" Steel 45 PSI Gas Main
Oak Street
20% Gas
20% Gas in sewer manholes
90% Gas @ curb
Electric service box 80% Gas
43
47
53
55

Hole Made When Shorted Electric Cable Arced Over To Gas Main



AEGIS

GPTC Guidelines
Class 2 Definition

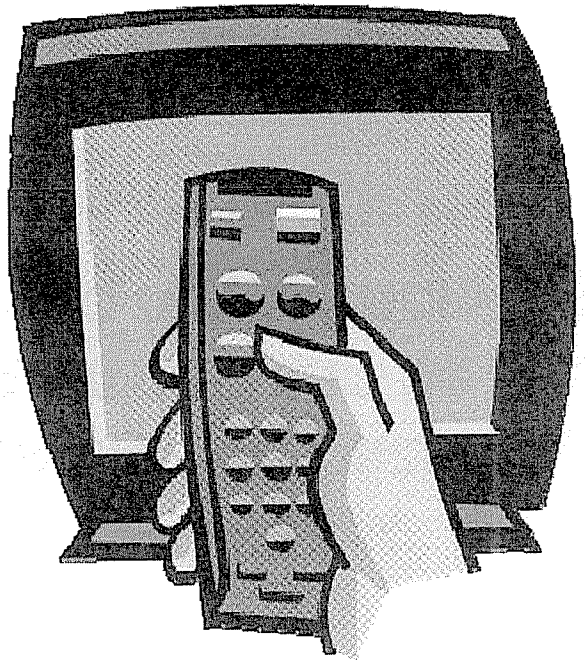
- A leak that is recognized as being non-hazardous at the time of detection, but justifies scheduled repair based on probable future hazard.

GPTC Guidelines
Class 3 Definition

- A leak that is non-hazardous at the time of detection and can be reasonably expected to remain non-hazardous.

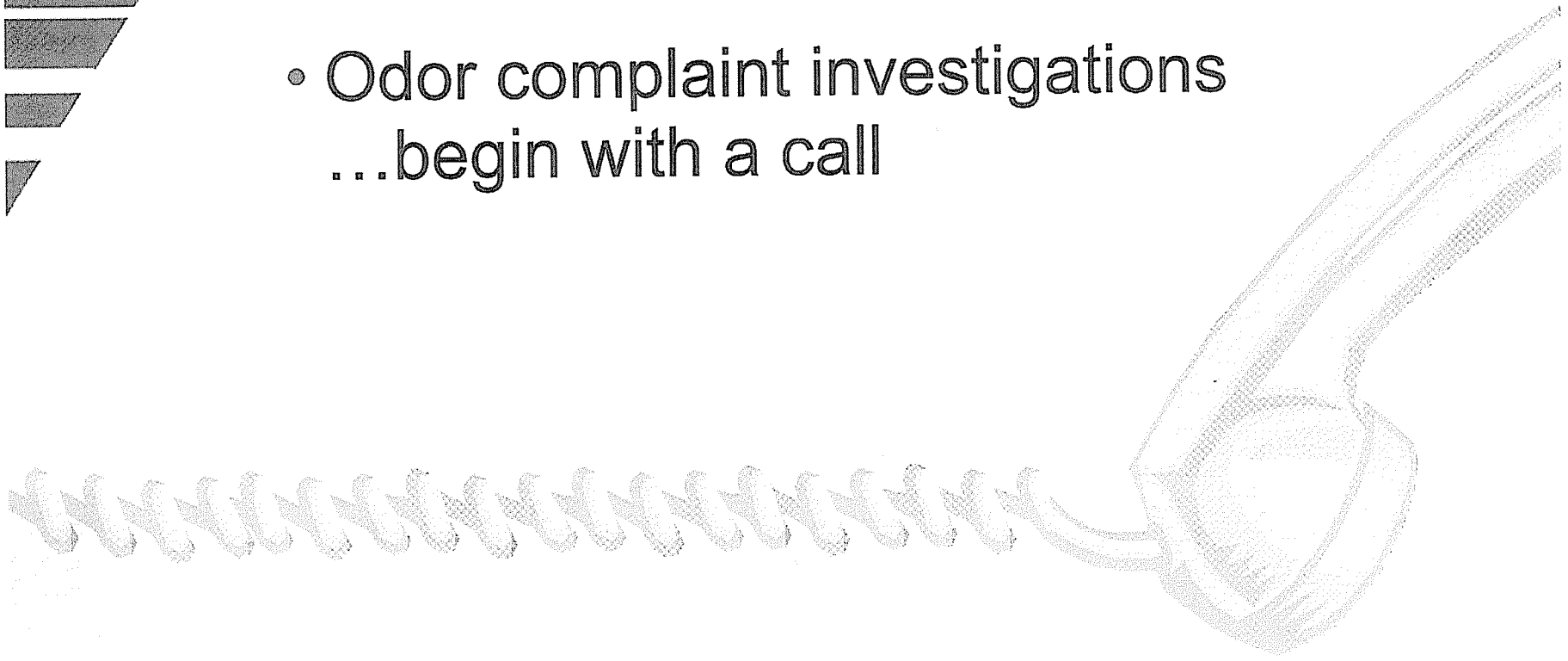
AEGIS

Anatomy Of A Gas Leak
A Collaborative Approach



AEGIS

- Odor complaint investigations
  …begin with a call

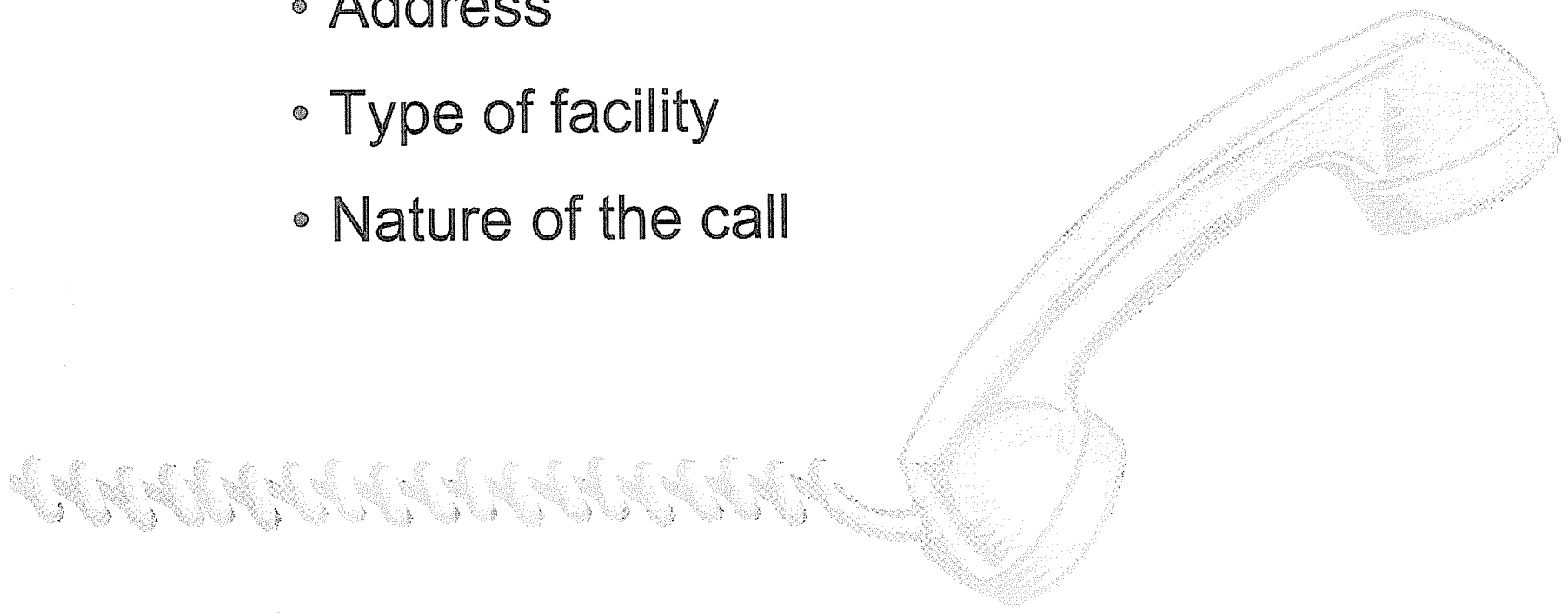


AEGIS

- An odor complaint call should be considered a Grade 1 leak…
  until *proven* otherwise.

Receiving The Call

- Basic information
- Name
- Address
- Type of facility
- Nature of the call



Incident (2002)
Company Retention $1,000,000

- A family of four died in their home as a result of carbon monoxide poisoning. It was discovered that the of the home's gas fired boiler was completely blocked by packed debris including leaves, branches and sticks.
- The homeowner had purchased an appliance service contract for his boiler from the gas company. Sometime later the homeowner believed his boiler needed service and called the gas company. A recording of the telephone conversation between the customer and the company's service representative reveled that the customer stated that he felt there was a need for service on his boiler because of a white residue that had collected outside the flue and around the boiler and he was afraid the boiler might "blow up". The customer service representative told the customer to shut it off and a service call was scheduled the for the following day.

Incident (1998)
Company Retention $1,000,000

Cont'd.

- The following day, upon arrival at the customer's home, the service technician, who was responding to an "adjust central house heater" order, advised the customer that there would be a $50.00 service charge because of the time of the year and the service request. The customer objected and said that he was not informed that there would be a charge and told the service technician that he no longer wanted the boiler inspected. The service technician left, never having entered the residence. Apparently, the service technician never asked the customer why he had called for service.
- Four weeks later the family was found dead due to CO poisoning.

AEGIS Incurred $3.2 Million

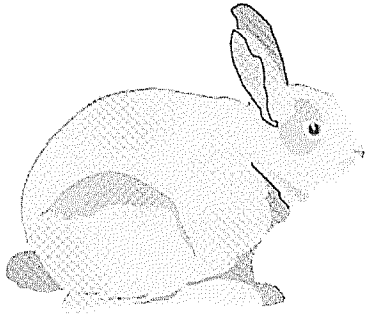
AEGIS

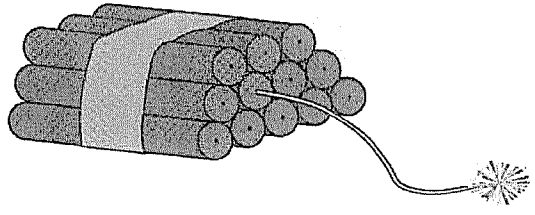
Lessons Learned

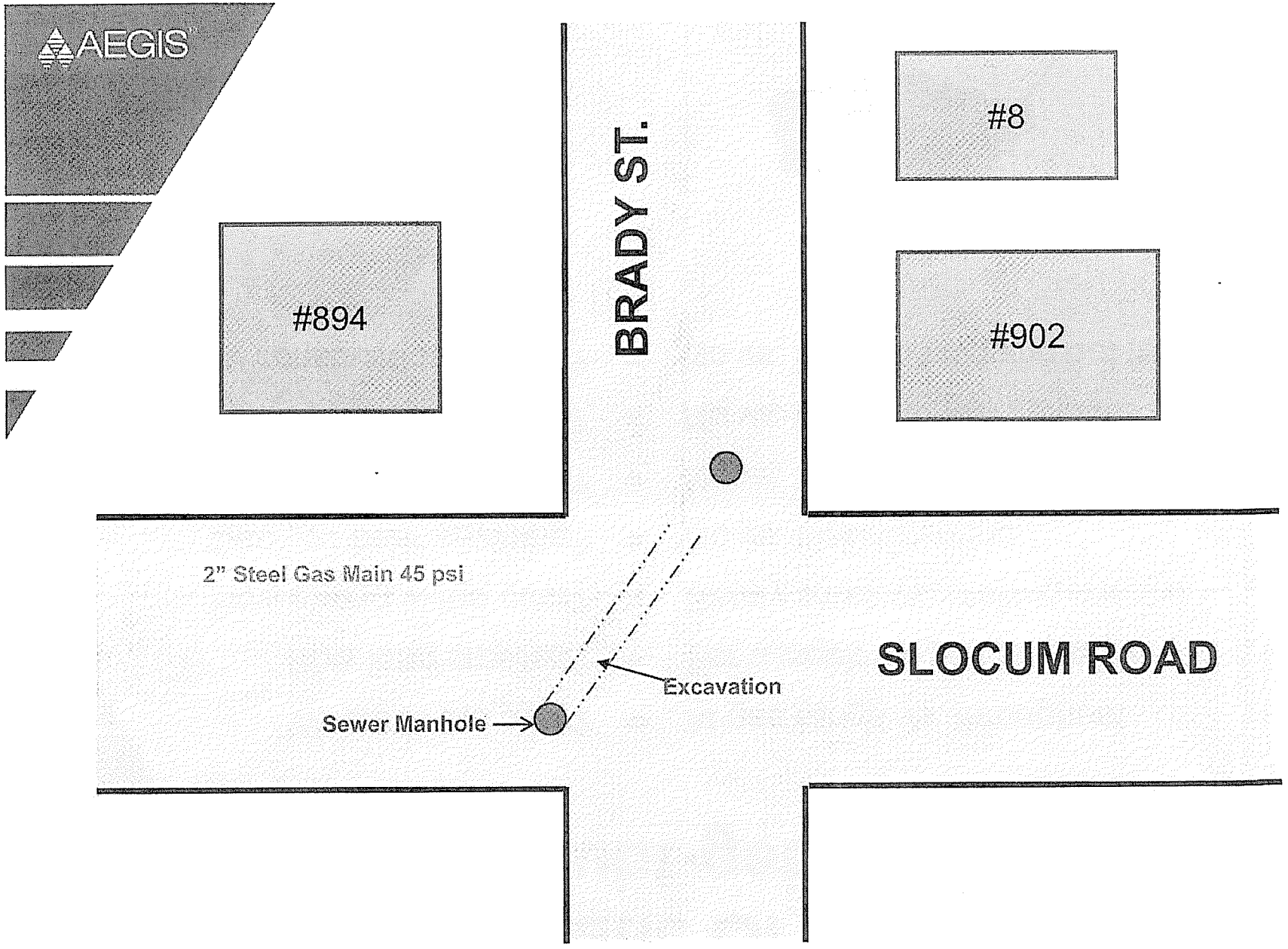
- The incident occurred because of poor communication between the CSR and the service technician and the service technician and the customer.
- In the first instance, the serviceman's work order did not indicate that the customer had stated that he was concerned about the safe operations of the furnace and that he was instructed to turn it off. The customer was also not told about the $50.00 service charge.
- The serviceman apparently believed the assignment was a routine service call to clean and adjust the burner. The serviceman never asked the customer why he had called the gas company i.e. "I am here to service your furnace, is that why you called?

Is It Static Or Dynamic?
"If in doubt-get them out"!

Where is the odor?	=	At gas range vs. throughout
How long smelled?	=	For a week vs. just noticed it
How strong is the odor?	=	Barely smell vs. making me sick
Can you hear anything?	=	No vs. hissing sound
Anyone moved recently?	=	No vs. apartment next door moved
Any plumbing done?	=	No vs. husband just installed range
Any construction in area?	=	No vs. backhoe digging out front



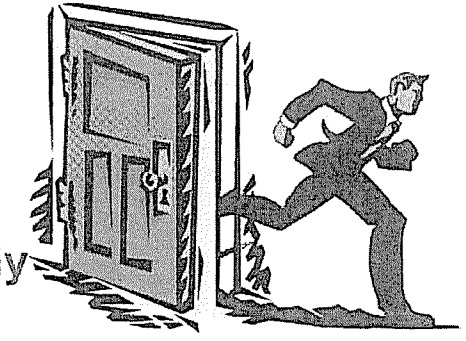



AEGIS
#894
BRADY ST.
#8
#902
2" Steel Gas Main 45 psi
Excavation
Sewer Manhole
SLOCUM ROAD

AEGIS

Steps to Consider When Receiving a Dynamic Call

- Ask the customer to leave the premises until help arrives
- Advise the customer to leave the phone off the hook and not to operate any lights or turn any appliances off or on



Leave things as they are... leave the premises immediately

Routine "Stable" Calls

Listen, ask questions, and transfer accurate information

1. **Where do you smell it?**	**This information will alert the first responder where to start checking.**
2. **Is the odor constant?**	**This information may help indicate if the leak is inside or outside or if there may be a problem with an appliance.**

AEGIS

Responding to Odor Complaint Calls

Remember:

- You must consider it to be a hazardous condition until you *prove,* by use of instrumentation, that it is not!

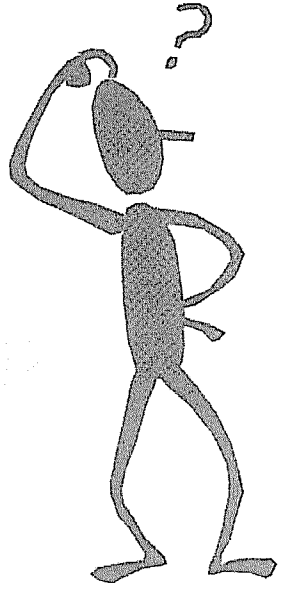
What Equipment Is Available?

- Combustible Gas Indicator
- Bead Sensor
- FI Unit (not intrinsically safe)
- Leak Detection Solution
- CO Detector
- Probe Bar
- Wrench/flashlight

Conducting The Investigation

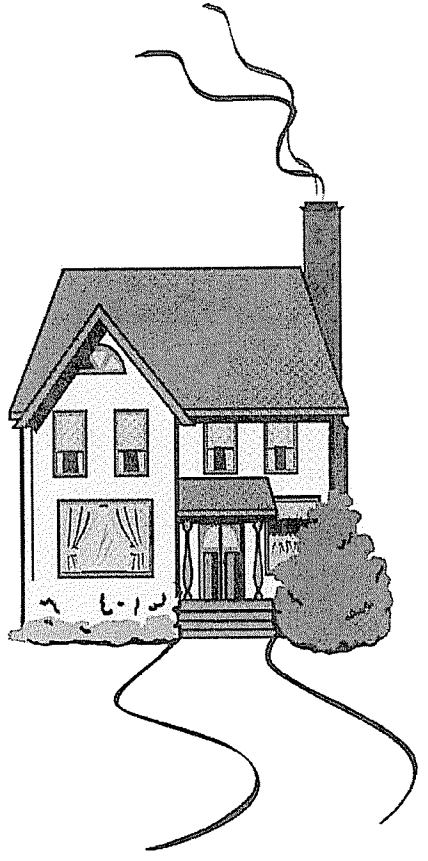
Do Not Assume Anything!

Test, Don't Guess

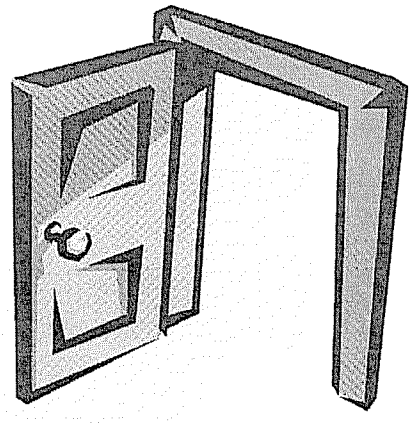


Approaching The Building

- Visual observations
  - Vegetation damage
  - Construction activities
  - Meter observations
- Olfactory senses
  - Do you smell anything?



Entering The Building

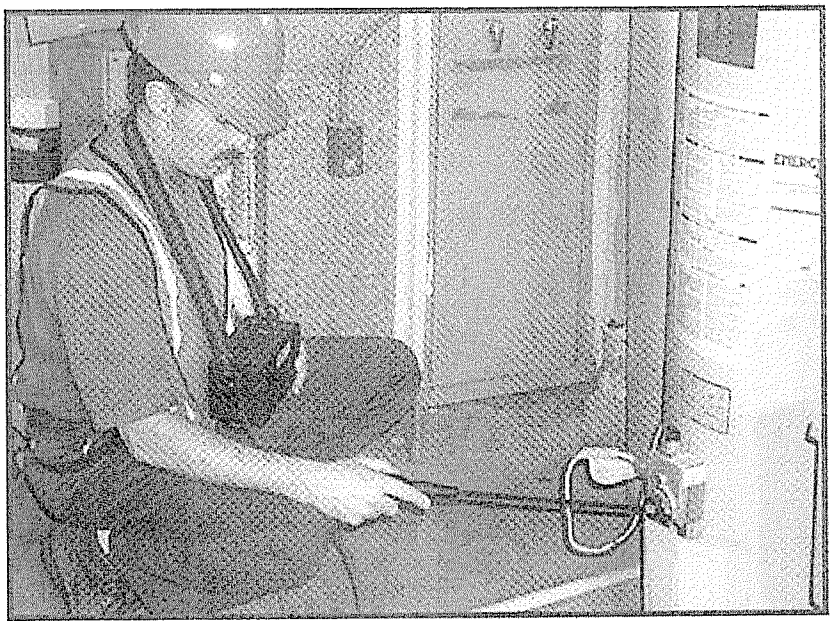


- CGI zeroed before entering
- Enter on LEL scale
- Check the problem area
- Continue search even if leak is found
- Did you find "*a*" leak or did you find "*the*" leak?

AEGIS

Expanding The Search

- Check the entire gas system
- Visual inspection of appliances and piping
- Check all utility entrances and floor drains



Other Conditions To Observe

- Carbon monoxide
- Other flammables
- Lack of make up air, vent size
- Scalding
- Other code violations

Action When A *Hazardous* Condition Is Found

- Red or "Danger" Tag
  - Document
  - Communicate
  - Disconnect
  - Follow up

Policies may vary from company to company

Completing The Investigation

- Shut in test/clock meter
- Test meter/leak detection fluid
- Bar test
  - At the meter (riser), service, along main and check all available openings
- Expand search if odor detected
- Document findings

AEGIS

Leaks Found On Odor Complaints Must Be:

- Repaired
- Shut off & tagged
- Classified (is it safe?)

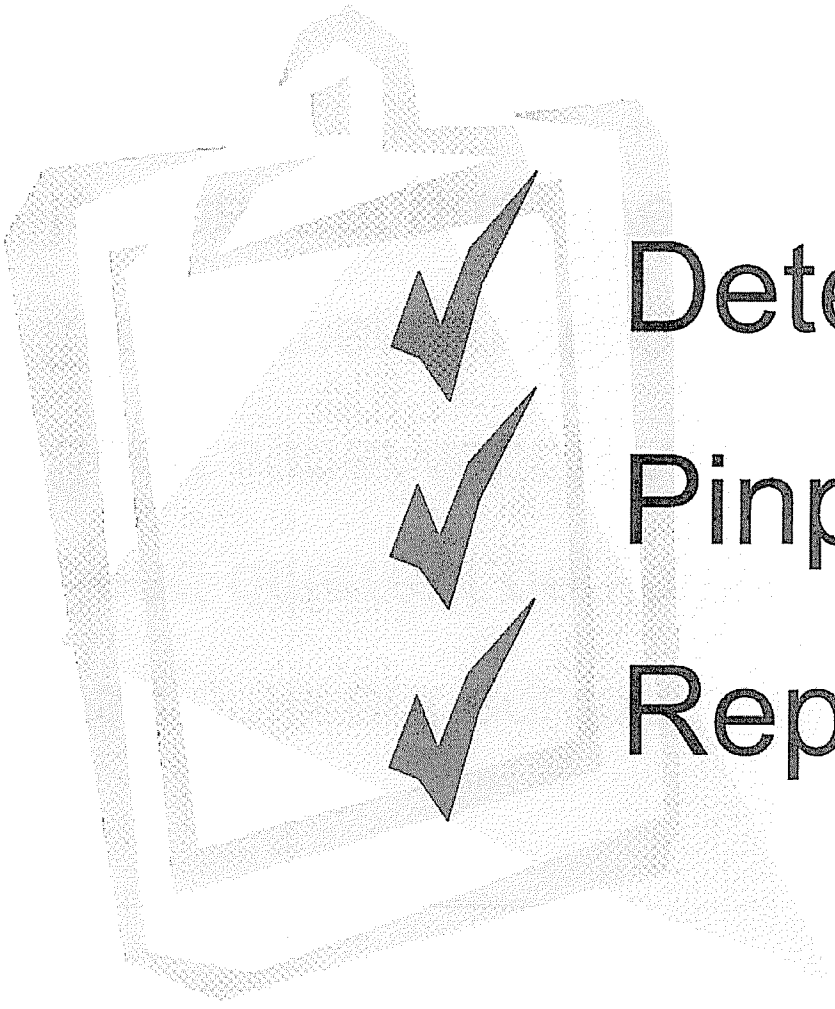
There should be no other options!

Repeat Calls

- Use different equipment
- Send different personnel
- Send supervisor to verify
- Track time/conditions
- Is it natural gas? (verify odor)

Remember, you must respond

AEGIS



Detect

Pinpoint

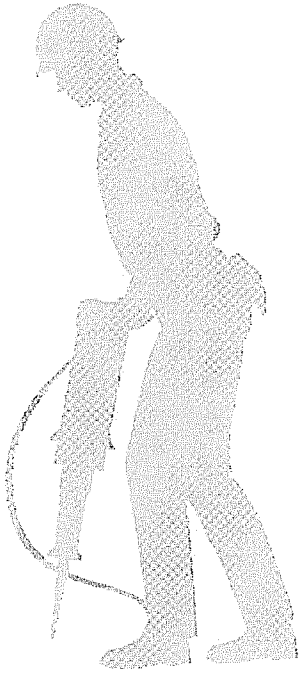
Repair

AEGIS

Pinpointing

Is not an exact science.

It is a developed skill which is learned and perfected through your mistakes and your successes.



AEGIS

Methods Of Locating The Line

- Maps
- Records
- System experience
- Electronic locators
  1. Basic principles of operation
  2. Inductive vs. Conductive
  3. Overcoming problems

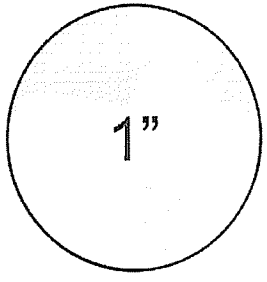
AEGIS

Consistency = Success

- Exact location of main, services etc.
- Size of test hole (aeration is the key)
- Depth of test hole (must be consistent)
- Location of test holes (same side of main)
- Instrument use (consistency in testing)

AEGIS

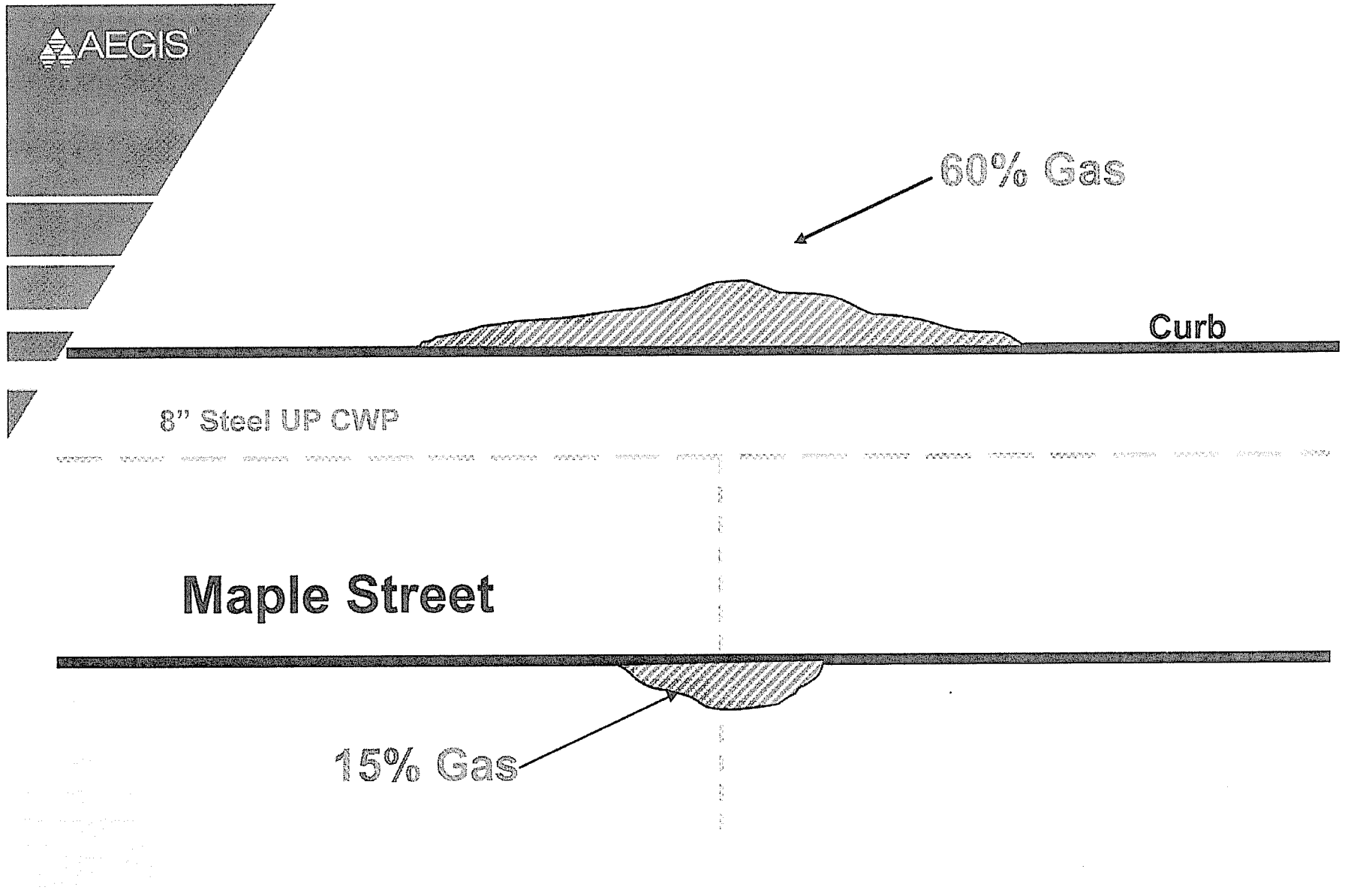
Size of the Test Holes Is Very Important In Venting the Gas

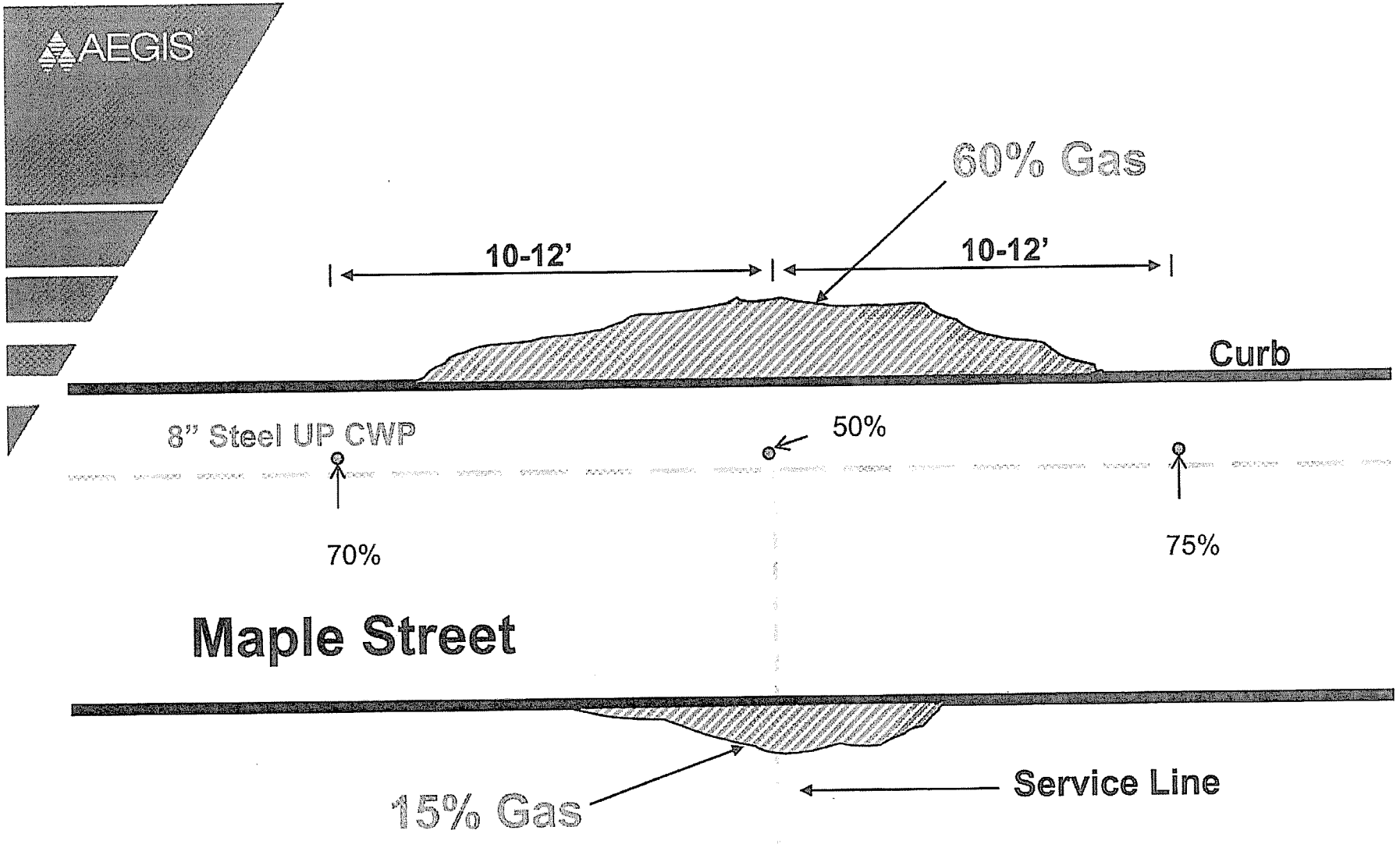


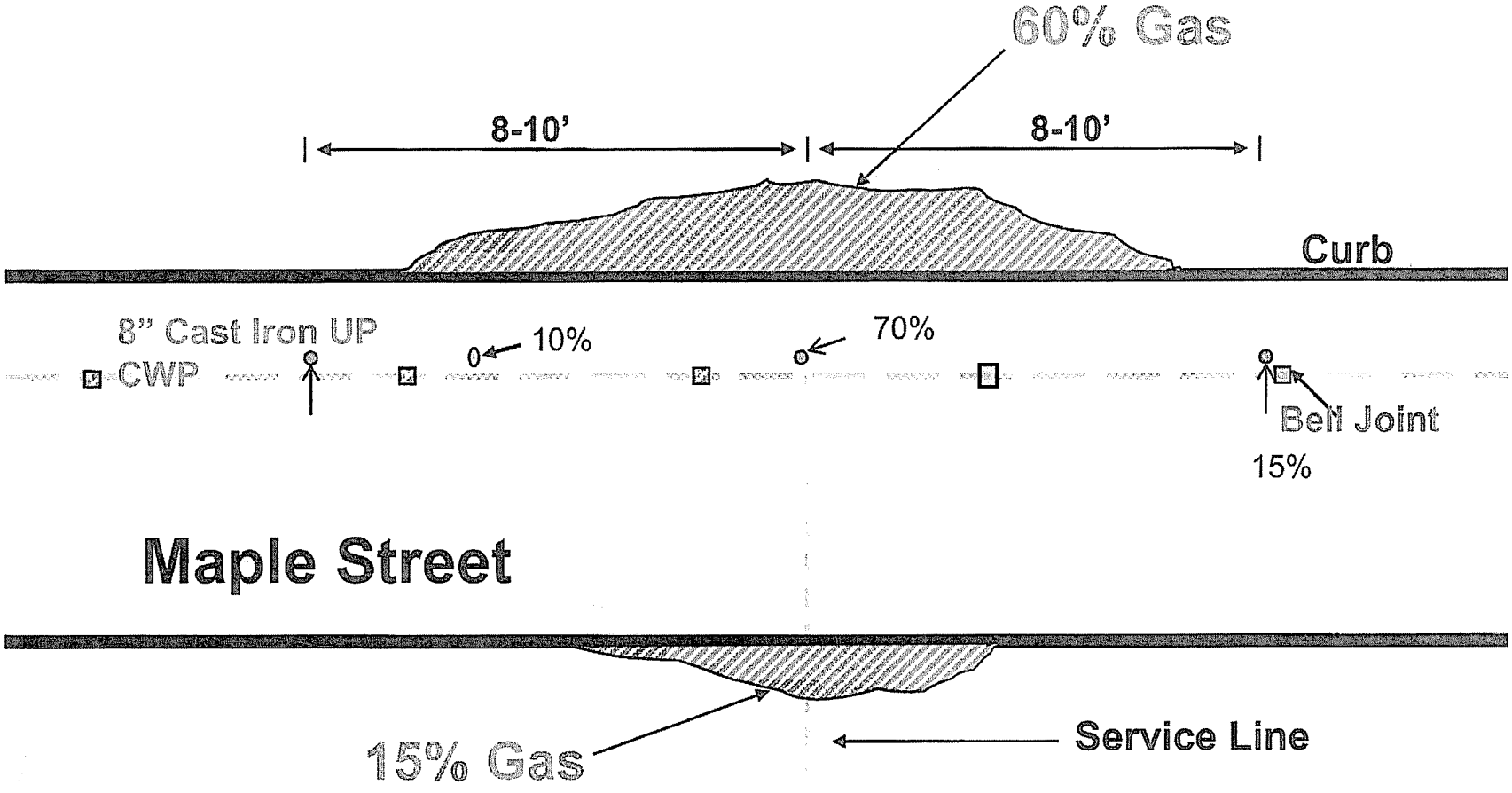
By using a 1” bar hole vs. a ½” bar hole you will have 4 X’s the aeration taking place.

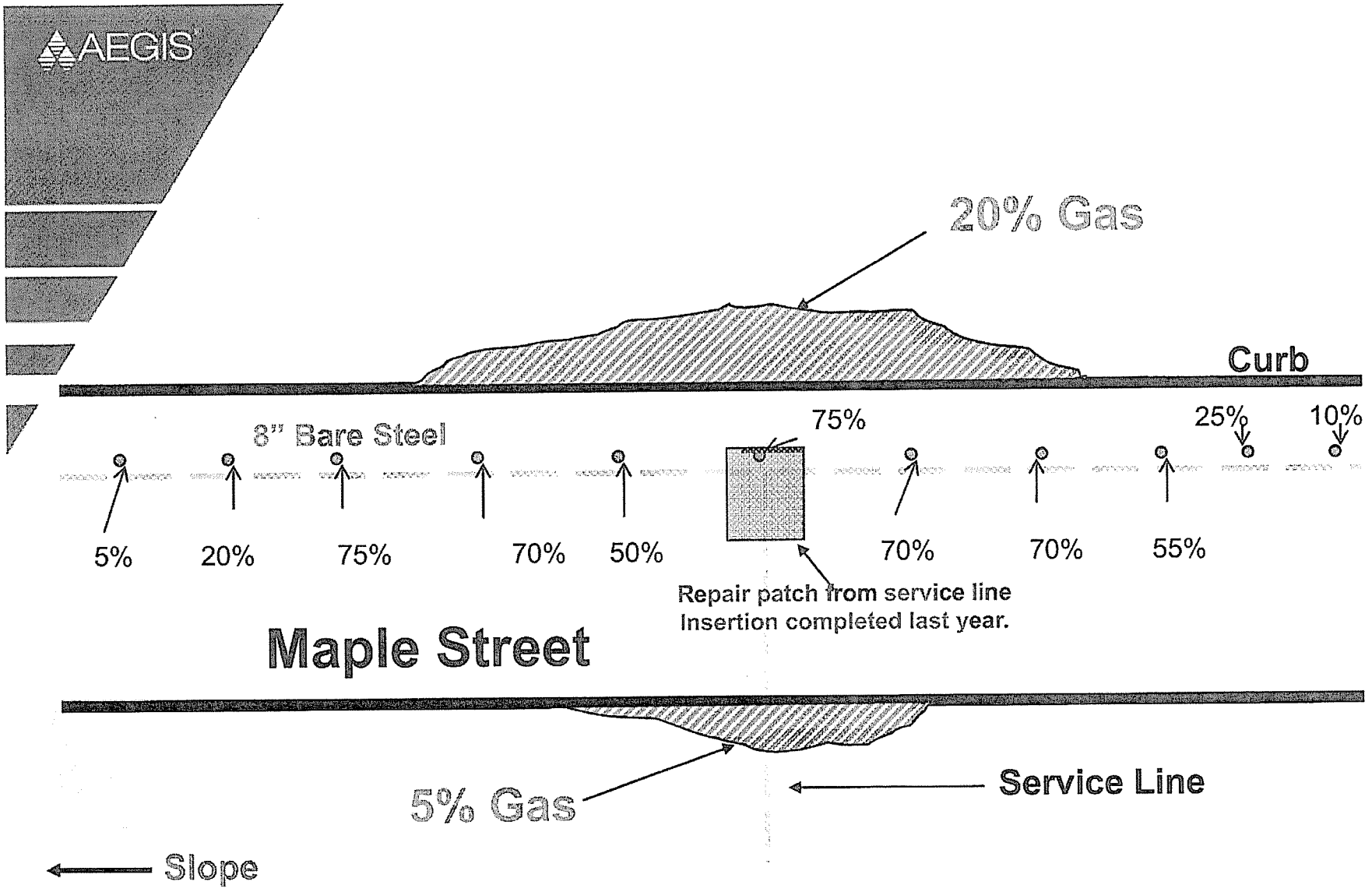
AEGIS

SAVE ANOTHER MISSED EXCAVATION


AEGIS
60% Gas
Curb
8" Steel UP CWP
Maple Street
15% Gas


AEGIS
60% Gas
10-12'
10-12'
Curb
8" Steel UP CWP
50%
70%
75%
Maple Street
15% Gas
Service Line


60% Gas
8-10'
8-10'
Curb
8" Cast Iron UP
CWP
0
10%
70%
Bell Joint
15%
Maple Street
15% Gas
Service Line


AEGIS
20% Gas
Curb
8" Bare Steel
75%
25%
10%
5%
20%
75%
70%
50%
70%
70%
55%
Repair patch from service line
Insertion completed last year.
Maple Street
5% Gas
Service Line
Slope

AEGIS

Don't Say OUPS

Old

Utility

Patch

Syndrome

Gas will collect in soil less compacted

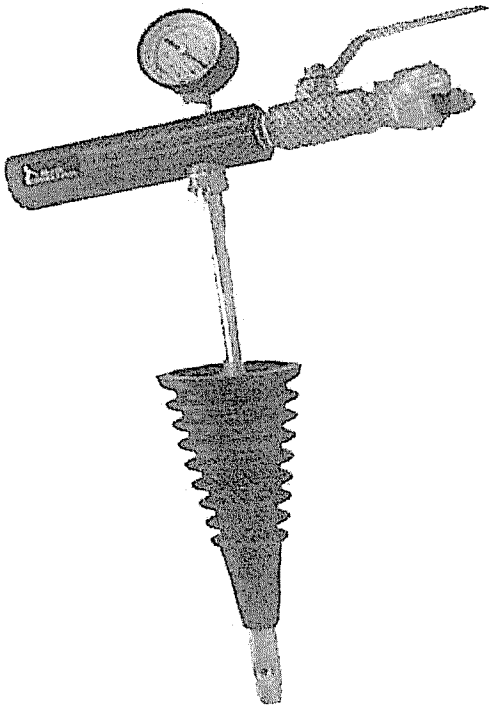
AEGIS

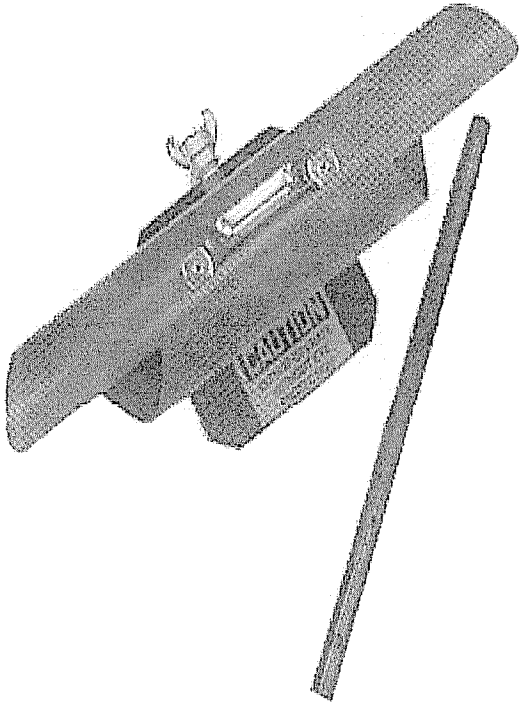
Test Methods

- Combustible gas indicator
  1. Top & bottom of hole
  2. Time the readings
- Natural ventilation
  1. Wait…let holes vent
- Blow pipe – vapors/soap top of hole
- Odor

AEGIS

Types of Soil Purgers/Aerators





AEGIS

Using The Soil Purger In The Pinpointing Process

- Purge from a hole where you know that the leak is not
- Plug holes near purge point
- *Dense soil or moisture* – time the purge/purge each hole
- Use it only when all other methods have failed

AEGIS

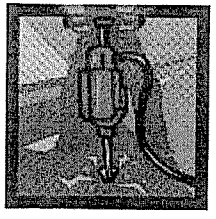
"Make Your Mark"

Using Your Experience

Using Test Results

Using System Design

Remember: **It is much cheaper to drill than to dig.**



Do you have **enough** holes to give you enough information about the leak?

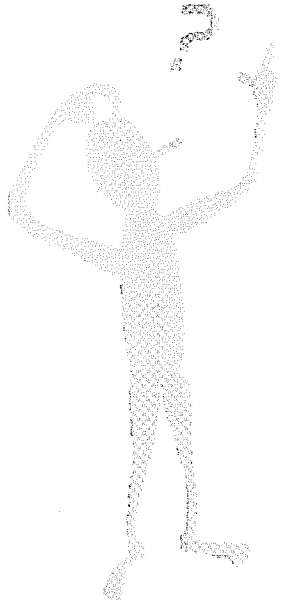
AEGIS

The Dry Hole

- Probe along the pipe
- Expose *all* of the pipe, not just the top
- Learn from your mistakes
- Use the hole to your advantage…
  no one "hits" them all
- Is it our gas?

Stray Gas

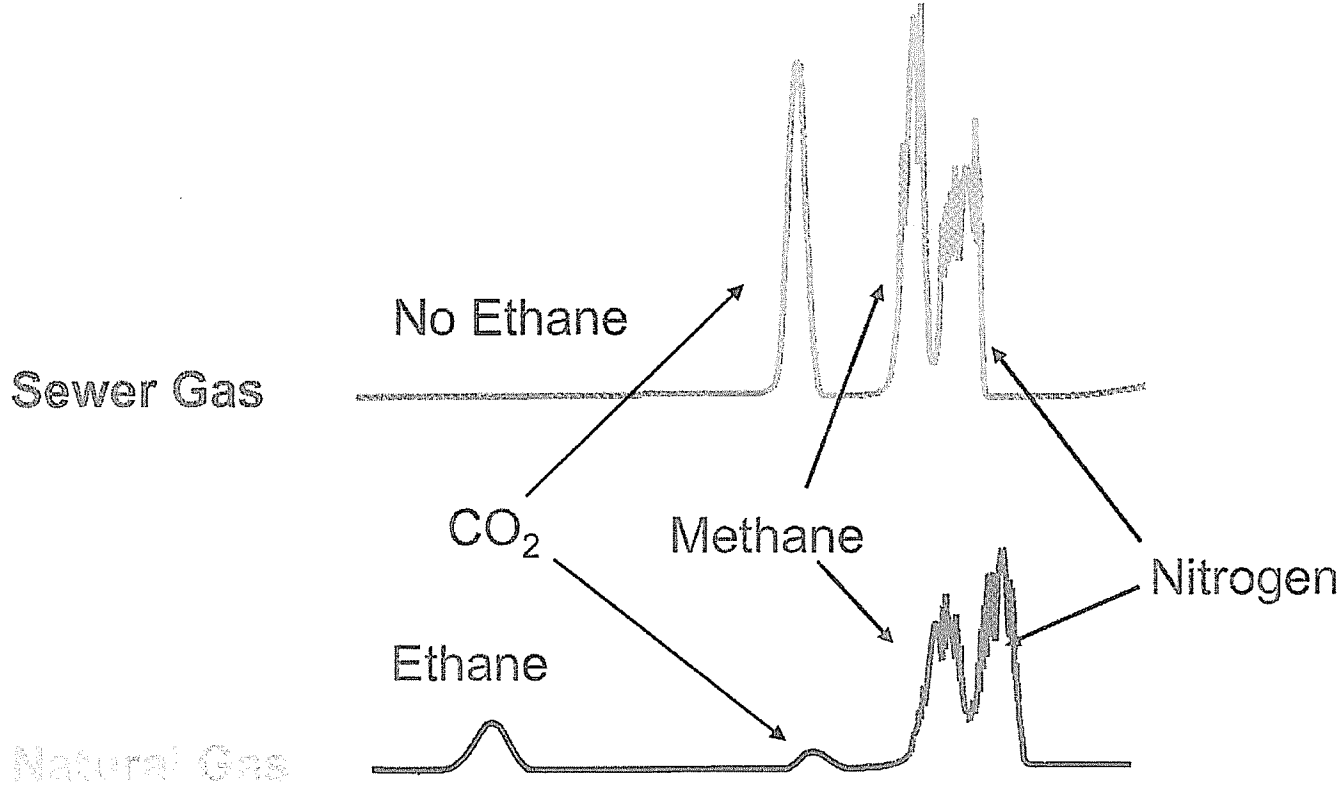
- Is it lighter or heavier than air?
- Is there ethane in the sample?
- Is it a hazard?
- What is sewer gas/decomposition gas?



- Natural gas vs. stray gas
- Use of charcoal filter
- Use of collection bottles/bags
- Responsibilities regarding stray gas
- “Reasonable person concept”

AEGIS

Chromatographic Analysis
Comparison



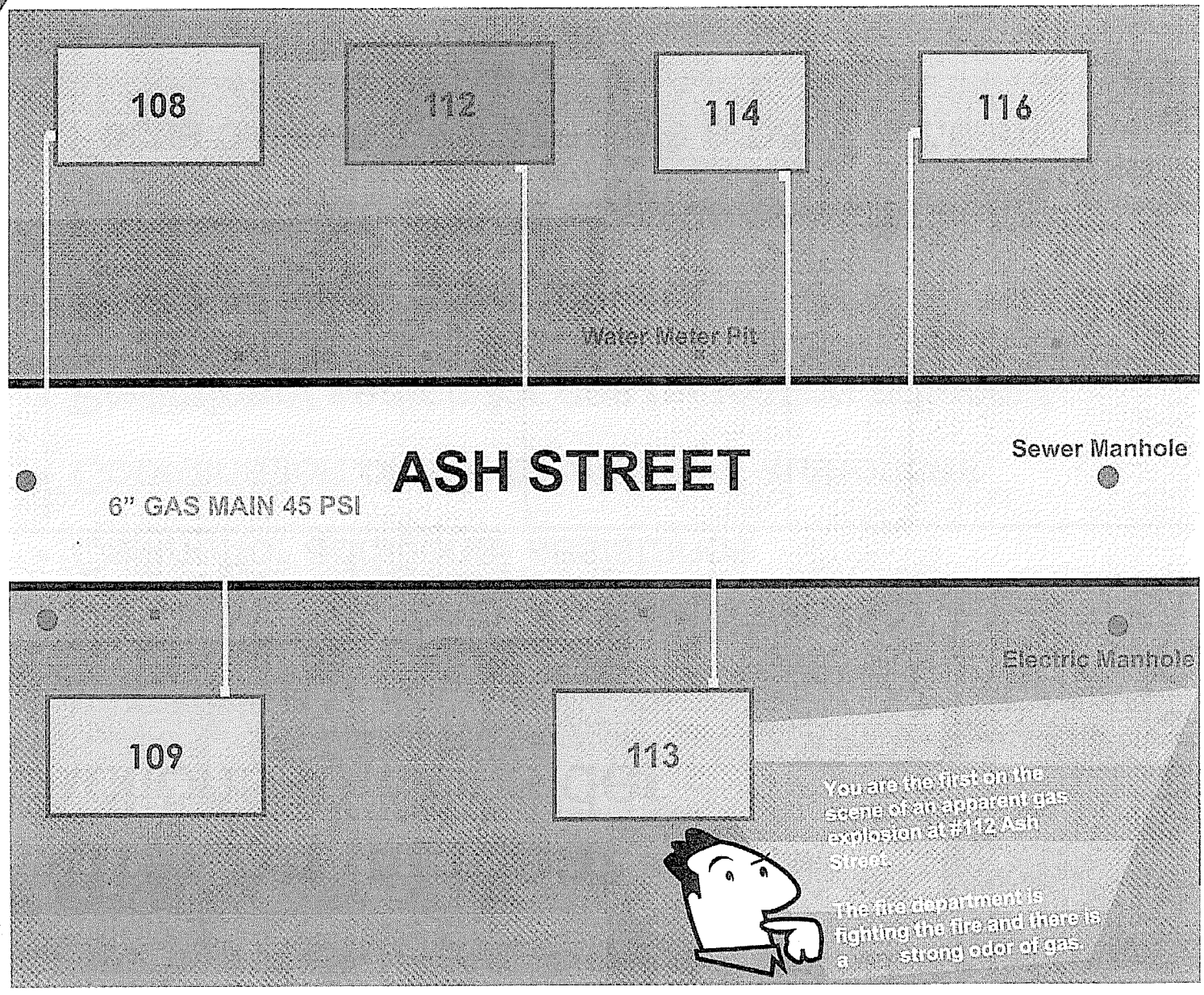
AEGIS

Emergency Response

Pre-planning Can Be Extremely Helpful

- Personnel readiness
- Personnel training
- Communication
- Emergency plan
- Coordination with fire service
- Availability of special equipment
- System records
- Involvement of claims & legal depts.
- Public relations - media response

AEGIS


108
112
114
116
Water Meter Pit
ASH STREET
Sewer Manhole
6" GAS MAIN 45 PSI
109
113
Electric Manhole
You are the first on the scene of an apparent gas explosion at #112 Ash Street.
The fire department is fighting the fire and there is a strong odor of gas.

After An Incident
Actions to Consider

- Prevention of related incidents
- Calling for additional assistance
- Coordination of efforts with civil authorities
- Preliminary search for gas by testing adjacent structures, barhole testing available openings…use good judgement
- Record results of tests positive or negative
- Focus only on the immediate area of concern

"It is not over until it's over…don't be part of history"

After An Incident
Other Actions to Consider

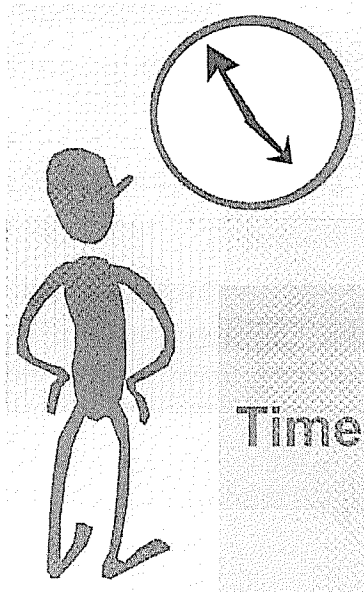
After the area is secured

- Have a skilled photographer on the scene ASAP, photographic documentation
- Sniff tests, odorant tests, witness and document
- Names and addresses of witnesses
- Verify equipment calibration/document
- Pressure testing -- only when skilled employees and proper equipment are at the scene and only according to your standards
- Develop an event timeline

AEGIS

Makesafe
Actions to Consider

- Implement emergency plan
- Call for additional help
- Notify police/fire departments
- Evacuate premises
- Block off the area
- Stop the flow of gas
- Eliminate ignition sources
- Vent area



Time Is Critical

Remember Public Safety!

Remember:
The Job Is Not Completed

- Until all paperwork/documentation is completed:
  - Neatly
  - Thoroughly
  - Accurately
- You may do everything right, but you may be judged by what is or is not documented

AEGIS

Our main job is *not*
finding & fixing leaks

Our main job is
public safety

AEGIS

Be Alert

Be Prepared

Be Safe

AEGIS Insurance Services, Inc.

Thank You

Please visit our website @

www.aegislink.com