

The Louisiana Mercury Reduction Act: Voluntary Assessment and Remediation from Natural Gas Production Sites from Land and Over Water*

By
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Abstract

On June 2, 2006 the Louisiana Legislature created Act No. 126 - the Louisiana Mercury Risk Reduction Act. This law gave authority to the Louisiana Department of Environmental Quality (LDEQ) to regulate mercury-added products and provided the authority necessary to address unregulated mercury sources. An important aspect of this law incorporates voluntary participation by natural gas production/transportation companies in the assessment and remediation of metering sites where mercury has been released.

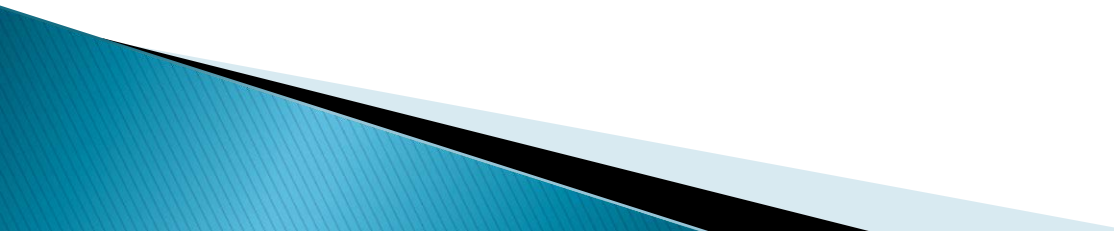
Beginning in the early 1990's, the voluntary program has been used by numerous companies to address the problem of mercury contaminated soil. Varied investigative approaches and remedial technologies have been implemented. A select group of site scenarios; e.g., pipe run, manifold, shed, tower, platform or environmental settings, such as urban areas, flooding lowlands, forested uplands/croplands, or marine/fresh waters, allow a streamlined and focused process for moving these sites through the regulatory process.

Over 30,000 potential sites exist in Louisiana. Approximately 5000 have been assessed and roughly 3000 have been remediated. About 900 additional sites are now participating in the process. This paper will discuss the procedures required to satisfy the Risk Evaluation and Corrective Action Program for those remaining sites on land as well as those in wetlands or over water


The Louisiana Mercury Reduction Act: Voluntary Assessment and Remediation at Natural Gas Production Sites On Land and Over Water

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San Antonio, Texas

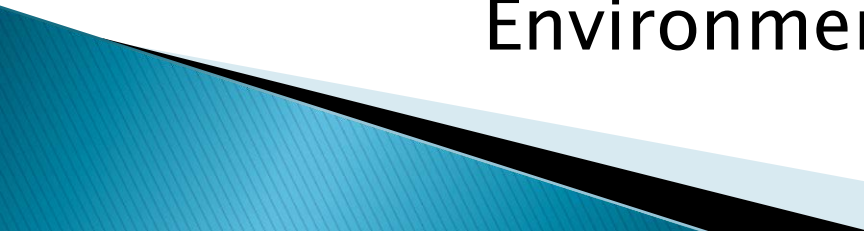
Acknowledgements

- ▶ Harold Leggett, Ph.D., Secretary, LDEQ
 - ▶ Thomas F. Harris, Administrator – ETD
 - ▶ Chris Piehler, Senior Environmental Scientist
 - ▶ Ron Gouguet, NOAA
 - ▶ All the Companies who voluntarily committed to the program
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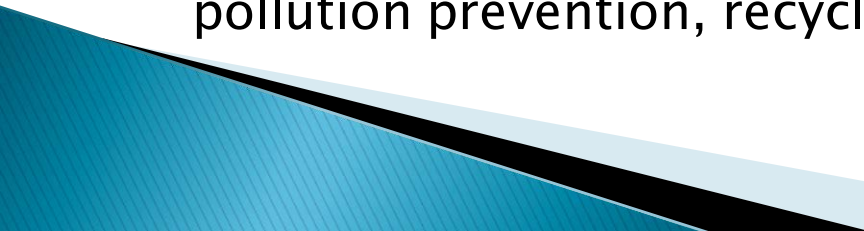
Highlights of the Mercury Program

- ▶ 1992 First voluntary assessment and remediation of meter site.
 - ▶ 1994 Formal funding by Legislature for programmatic study of mercury in the environment.
 - ▶ 1998 RECAP established soil and groundwater standards.
 - ▶ 2000 First use of Cooperative Agreements to define participating parties goals and responsibilities.
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Highlights of the Mercury Program

- ▶ 2004 Governor Blanco selects the Mercury Initiative to showcase LDEQ activities.
 - ▶ 2006 Senate Bill 615 signed into law as Act No. 126 – The Louisiana Mercury Risk Reduction Act.
 - ▶ 2007 First NFA–ATT for Overwater Sites establishing approach for evaluation and remediation.
 - ▶ 2008 LDEQ and participating companies join EPA National Partnership for Environmental Priorities (NPEP).
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Goals of the Act: Reduce mercury releases to the environment

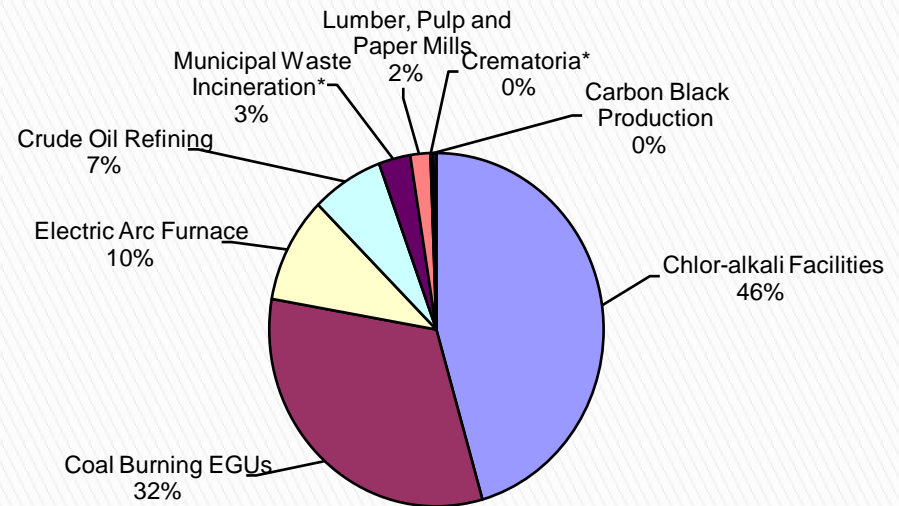
- ▶ Implement the Louisiana Mercury Risk Reduction Act of 2006 to regulate mercury in products and devices, and monitor development of required collection systems including convenience switches and anti-lock braking systems in end-of-life vehicles.
 - ▶ Control emissions from coal-burning electrical generating units by implementing the federal Clean Air Mercury Rule, monitor for effectiveness, and implement further strategies if necessary.
 - ▶ Study emissions from former mercury-cell chlorine manufacturers to ensure environmental protection is adequate during and after conversion to membrane-cell technology.
 - ▶ Discourage waste incineration if mercury is a significant component of the waste and encourage waste minimization, pollution prevention, recycling, and beneficial re-use.
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Goals of the Act: Reduce mercury releases to the environment

- ▶ Implement the Mercury Minimization Plan for the Louisiana Permit Discharge Elimination System to detect and address mercury releases through wastewater discharges.
- ▶ Scrutinize industrial landfills for controllable mercury releases. Establish requirements for best management practices to minimize off-site transport of mercury.
- ▶ Promote voluntary remediation of legacy mercury manometer sites and seek program continuation in the absence of volunteers.
- ▶ Support activities that reduce soil erosion and other nonpoint discharges to limit transport of background mercury in native soils washed to stream by rainfall. Support the Louisiana Nonpoint Source Management Plan as it applies to minimizing sediment in runoff.

Mercury Releases by Activity

- ▶ Chlor-Alkali Plants 2500
- ▶ Coal Power Plants 1644
- ▶ Crude Oil Refineries 471
- ▶ Electric Arc Furnaces 450*
- ▶ Carbon Black Plants 127
- ▶ Paper Mills 46
- ▶ Crematoria 21



2004 TRI DATA (in lbs)

PERCENTAGE BY
INDUSTRY

Prior Meter Remediation Projects

- ▶ Fina – 8/8
- ▶ ARKLA – 62/62
- ▶ ANGI – 41/130
- ▶ Seagull – 45/60
- ▶ SONAT – 1/1
- ▶ USF&WS – 510
- ▶ NorAM – 2/2
- ▶ Columbia – 16/16
- ▶ Trunkline – 34/52
- ▶ Delhi – 7/7
- ▶ LIG – 285/429
- ▶ NorAm – 51/64
- ▶ ARCO – 9/9
- ▶ Gas Masters 150?
- ▶ SONAT – 6/6
- ▶ USF&WS – 485/530
- ▶ TOTALS: 1052/1376 (76%) 660 USF&W

Recent Meter Remediation Projects

Williams / Transco		El Paso/ Sonat / ANR		CenterPoint		Gulf South / Koch	
NFA-ATT	meters	NFA-ATT	meters	NFA-ATT	meters	NFA-ATT	meters
4/08/04	2	11/02/01	20	12/13/05	100	7/26/04	100
5/03/04	1	2/08/02	84	12/13/05	45	7/26/04	100
7/02/04	39	1/21/03	10	1/31/06	24	9/01/04	100
10/14/05	26	2/28/05	7	3/10/06	42	9/01/04	100
8/13/07	1	6/06/05	44	3/13/06	54	9/01/04	82
3/11/08	3	7/27/07	17*	3/17/06	30	5/19/05	60
Pending	22	4/14/08	4				
Total	72	Total	169	Total	295	Total	542

* These 17 site were evaluated for impacts in marine or estuarine waters.

Many Operators did not provide the number of non-remediated sites

Current Projects

- ▶ EnerVest – Monroe Gas Field – CA 01 /08
 - 400+ Active meter locations.
 - Unknown number of prior sites or abandoned meters.
 - 40 meters per year replacement.
 - 40 additional sites evaluated/remediated per year.
 - 10 year program – can expedite to shorten timeframe.
 - Targeted meter replacement will remove 320+ lbs of mercury per year.
 - Invited to join EPA–NPEP

What do these meters look like?



Where are these meters found?



What is the problem?





















How are these sites remediated ?







Table 2666
Transcontinental Gas Pipe Line Corporation
Louisiana Mercury Assessment and Remediation Program - A1# 104236
2001-2003 Assessment and Remediation Verification Sample Results
Humble Thibodaux (Talgate) M&R, Tubes 2157 and 2666, LaFourche Parish, LA

A. Laboratory Report 02010582.d and 02020584.e

Sample ID	Lab ID	Sample Date	Analytical Result
2666-0909	01	1/18/02	0.2
2666-0810	02	1/18/02	0.08
2666-0811	03	1/18/02	0.2
2666-0909	39	1/18/02	0.1
2666-0912	04	1/18/02	0.07
2666-0913	05	1/18/02	0.08
2666-1008	38	1/18/02	0.2
2666-1013	06	1/18/02	0.6
2666-1108	37	1/18/02	0.48
2666-1113	07	1/18/02	0.1
2666-1209	35	1/18/02	0.3
2666-1212	09	1/18/02	0.09
2666-1213	08	1/18/02	0.1
2666-1307.5 (dup of 1307)	10*	1/18/02	0.243
2666-1309	11*	1/18/02	0.134
2666-1312/D3	10	1/18/02	
2666-1312/D3 (dup of 1312/D3)	40	1/18/02	
2666-1313	53	1/18/02	0.0472
2666-1409	32	1/18/02	0.3
2666-1412	11	1/18/02	0.09
2666-1508	47	1/18/02	0.281
2666-1509	20	1/18/02	0.2
2666-1509.5 (dup of 1509)	21	1/18/02	0.2
2666-1513	12	1/18/02	0.2
2666-1607	46	1/18/02	
2666-1608	19	1/18/02	
2666-1613	13	1/18/02	0.04
2666-1708	45	1/18/02	0.334
2666-1709	18	1/18/02	0.68
2666-1710	17	1/18/02	0.2
2666-1711	16	1/18/02	0.86
2666-1712	15	1/18/02	0.5
2666-1713	14	1/18/02	0.09
2666-D1	34	1/18/02	0.2
2666-W1/D2	33	1/18/02	0.1
2666-W2	09*	1/18/02	

The laboratory reports for the samples collected in January 2002 were previously submitted to the LDEC. The samples with an * next them correspond to laboratory report #02020586.

B. Laboratory Report 03020223.e

Sample ID	Lab ID	Sample Date	Analytical Result
2666-0810-SWV	20	2/6/03	0.0785
2666-0909-SWV	21	2/6/03	0.0479
2666-0810-FV-15	23	2/6/03	0.0499
2666-0812-0913-SWV	20	2/6/03	<0.033
2666-0813-1013-SWV	28	2/6/03	0.16
2666-1008-FV-25	28	2/6/03	0.216
2666-1013-FV-25 (dup of 1009-FV-25)	25	2/6/03	0.287
2666-1010-FV-13	19	2/6/03	0.0465
2666-1011-FV-12	18	2/6/03	0.0453
2666-1012-FV-17	27	2/6/03	0.0814
2666-1109-SWV	22	2/6/03	0.431
2666-1110-FV-14	24	2/6/03	0.864
2666-1112-FV-11	31	2/6/03	0.0659
2666-1113-1213-SWV	29	2/6/03	<0.033
2666-1212-1313-SWV	33	2/6/03	
2666-1312/D2-FV-12	32	2/6/03	0.0501
2666-1313-1412-SWV	34	2/6/03	0.0737
2666-1408-1509-SWV	04	2/5/03	
2666-1412-FV-18	35	2/6/03	0.077
2666-1507	15	2/6/03	
2666-1507-1806-SWV	10	2/5/03	0.365
2666-1508-SWV	06	2/5/03	
2666-1510-FV-17	02	2/5/03	0.0834
2666-1512-FV-12	38	2/6/03	0.227
2666-1512-SWV	37	2/6/03	0.0525
2666-1513-SWV	36	2/6/03	0.341
2666-1513-1613-SWV	39	2/6/03	0.0352
2666-1606	17	2/6/03	
2666-1606-1707-SWV	13	2/5/03	
2666-1607-FV-16	12	2/5/03	0.0638
2666-1608-FV-13	11	2/5/03	0.19
2666-1609-FV-17	01	2/5/03	0.192
2666-1609-FV-17 (dup of 1609-FV-17)	03	2/5/03	
2666-1610-FV-15	06	2/5/03	0.628
2666-1611-FV-12	06	2/5/03	<0.033
2666-1612-FV-11	40	2/6/03	0.119
2666-1613-1713-SWV	42	2/6/03	0.461
2666-1707	16	2/6/03	0.567
2666-1708-SWV	14	2/5/03	
2666-1709-SWV	05	2/5/03	0.943
2666-1710-1711-SWV	07	2/5/03	
2666-1712-SWV	41	2/8/03	0.25
2666-1712-SWV	07	2/8/03	0.25
2666-TCLP	43	2/6/03	<0.0002

C. Laboratory Report 03020459.e

Sample ID	Lab ID	Sample Date	Analytical Result
2666-1212-1313-SWV-16	25	2/12/03	0.3
2666-1408	06	2/12/03	
2666-1408-SWV-16	16	2/12/03	<0.033
2666-1408-1407-SWV-18	13	2/13/03	0.258
2666-1407	05	2/12/03	0.883
2666-1408	04	2/12/03	0.0781
2666-1408-1508-SWV-22	29	2/12/03	
2666-1509	03	2/12/03	
2666-1508-SWV-10	10	2/12/03	0.34
2666-1507-FV-15	12	2/12/03	0.114
2666-1508-FV-12	11	2/12/03	0.0626
2666-1508-SWV-10	09	2/12/03	0.325
2666-1509-1608-SWV-29	18	2/12/03	0.325
2666-1605	02	2/12/03	1
2666-1605-1708-SWV-11	15	2/12/03	<0.033
2666-1606-FV-10	17	2/12/03	
2666-1617-FV-10 (dup of 1606-FV-10)	14	2/13/03	
2666-1609-FV-23	22	2/12/03	<0.033
2666-1609-SWV-23	21	2/12/03	0.102
2666-1617-SWV-23	20	2/12/03	0.236
2666-1706	01	2/12/03	0.289
2666-1706-FV-20	07	2/12/03	
2666-1708-SWV-18	08	2/12/03	
2666-1709-1710-SWV-14	18	2/12/03	<0.16
2666-1710-1711-SWV-11	23	2/12/03	0.72
2666-1717-SWV-11	24	2/12/03	0.6
2666-1807	26	2/12/03	
2666-1808	27	2/12/03	0.845
2666-1810	28	2/12/03	0.0521

D. Laboratory Report 03020714.d

Sample ID	Lab ID	Sample Date	Analytical Result
2666-1306	24	2/18/03	0.0339
2666-1306-1307-SWV-19	25	2/18/03	<0.033
2666-1307	26	2/18/03	<0.033
2666-1307-1407-SWV-16	27	2/18/03	<0.033
2666-1405	21	2/18/03	
2666-1405-1505-SWV-13	20	2/18/03	<0.033
2666-1406-FV-19	23	2/18/03	0.0797
2666-1406-1508-SWV-21	05	2/18/03	<0.033
2666-1408-1508-SWV-15	01	2/18/03	<0.033
2666-1417-FV-16	22	2/18/03	0.389
2666-1505	18	2/18/03	<0.033
2666-1506-FV-11	19	2/18/03	<0.033
2666-1507-FV-24	04	2/18/03	<0.033
2666-1508-1607-SWV-25	02	2/18/03	<0.033
2666-1517-FV-24	03	2/18/03	<0.033
2666-1605-1708-SWV-18	07	2/18/03	<0.033
2666-1606-FV-23	06	2/18/03	<0.033
2666-1607-1608-SWV-25	28	2/18/03	<0.033
2666-1707-1809-SWV-13	17	2/18/03	
2666-1708-FV-22	09	2/18/03	0.178
2666-1708-1808-SWV-22	08	2/18/03	<0.033
2666-1806	16	2/18/03	0.77
2666-1807-FV-12	14	2/18/03	<0.033
2666-1808-1908-SWV-12	10	2/18/03	0.053
2666-1817-FV-12	13	2/18/03	<0.033
2666-1907	15	2/18/03	0.323
2666-1907-1908-SWV-13	12	2/18/03	<0.033
2666-1908	11	2/18/03	

E. Laboratory Report 03030966.e

Sample ID	Lab ID	Sample Date	Analytical Result
2666-1306	03	2/25/03	0.0996
2666-1306-1404-SWV-0-13	13	2/25/03	0.24
2666-1404	02	2/25/03	0.505
2666-1404-1505-SWV-0-10	11	2/25/03	0.186
2666-1405-FV-14	12	2/25/03	0.13
2666-1707-1808-SWV-0-12	01	2/25/03	
2666-1808-1908-SWV-0-8	06	2/25/03	0.0606
2666-1908-FV-9	04	2/25/03	
2666-1908	07	2/25/03	0.481
2666-1917-FV-9	05	2/25/03	0.671
2666-2007	09	2/25/03	0.296
2666-2007-2008-SWV-0-9	10	2/25/03	0.798
2666-2008	08	2/25/03	

F. Laboratory Report 03030976.e

Sample ID	Lab ID	Sample Date	Analytical Result
2666-1707-1808-SWV-0-17	01	3/3/03	0.144
2666-1808-1908-SWV-0-14	05	3/3/03	0.784
2666-1908-FV-19	03	3/3/03	0.927
2666-1917-FV-19	04	3/3/03	0.603
2666-2007-2008-SWV-0-17	02	3/3/03	

G. Laboratory Report 03030281.e

Sample ID	Lab ID	Sample Date	Analytical Result
2666-2007-2008-SWV-0-20	01	3/6/03	
2666-2017-2018-SWV-0-20	02	3/6/03	0.352

H. Laboratory Report 03030474.e

Sample ID	Lab ID	Sample Date	Analytical Result
2666-2007-2008-SWV-0-18	01	3/11/03	0.422
2666-2017-2018-SWV-0-18	02	3/11/03	0.987

NOTES:

Laboratory reports B-H shown above correspond to remediation verification samples collected after respective excavation events. If a verification sample result indicated the concentration of mercury was above 1.0 mg/g, further excavation activities were completed in that area and new verification samples were collected.

1 - Verification sample 2666-2008, collected on 2/25/03, was deemed "clean" by the landowner.

Sample locations with mercury results above 1.0 mg/g were overexcavated and verification samples results are shown on the next corresponding laboratory report (i.e. 2666-1212-1313-SWV was overexcavated and the verification sample 2666-1212-1313-SWV-16 is shown on laboratory report C.

All results reported in mg/kg Hg except for TCLP sample 2666-TCLP where results are reported in ug/L.

Analytical results shown in BOLD and SHADED GRAY indicate a result greater than 1.0 mg/kg Hg.

More Challenges: Over Water







Assessment for Over Water Sites

- ▶ Two scenarios: Fresh or Estuarine Waters.
 - Atchafalaya Basin
 - Coastal Plaquemines Parish
- ▶ Ecological risk based on sediment and biota.
 - Risk Based Corrective Action Program (RECAP)
 - Biota–sediment accumulation factor (BSAF)
 - Food web model
- ▶ Parameters for evaluation.
 - Total Hg TOC Grain size
 - Total sulfides DO pH Water Temp
 - Turbidity Salinity Conductivity

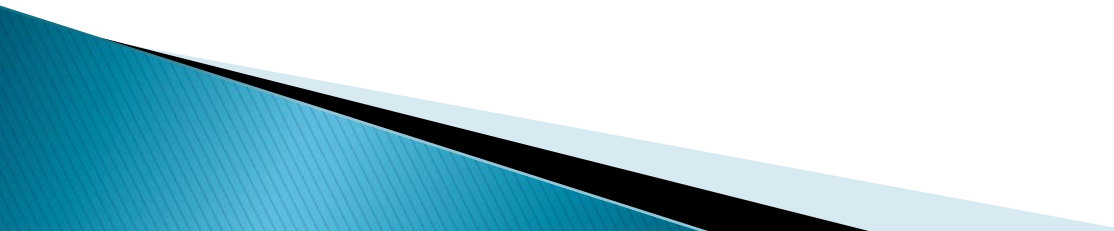
Assessment for Over Water Sites

- ▶ Based on lower trophic level organisms.
 - Sediment–biota interface is most direct.
 - Act as critical food sources for higher trophic levels.
- ▶ Biota for Fresh Waters
 - Crawfish – crustaceans
 - Mosquito fish – forage fish
- ▶ Biota for Estuarine Waters
 - Blue Crab – crustaceans
 - Small fish – forage fish

Risk Evaluation using BSAF

- ▶ Site specific sediment Hg values.
- ▶ Biota body Hg values.
- ▶ BSAF factor.
- ▶ Food web modeled to most sensitive receptor species (Great Blue Heron).
- ▶ Acceptable ecological risk is a Hazard quotient (HQ) of 1.0 or less.
- ▶ Human Health Assessment by comparison to FDA/EPA food advisory of 0.5 mg/kg in fish and shellfish (based on 12 ounces per week).

Over Water Conclusions

- ▶ The Pilot Study for over water sites was appropriate and representative of those sites evaluated. (NOAA and LDEQ)
 - ▶ The Final Report and conclusions indicate acceptable risk levels for those 17 sites.
 - ▶ This Ecological Risk Evaluation approach for sites over water in a variety of settings is a valuable tool for bringing sites to closure.
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Benefits of Participation

- ▶ **Reduces** available mercury in the environment.
- ▶ **Reduces** mercury uptake in fish – humans.
- ▶ **Reduces** exposure risk to employees.
- ▶ **Reduces** cleanup/disposal costs vs. regulatory program mandated procedures.
- ▶ **Reduces** risk of penalties for non-compliance.
- ▶ Proactive project are **GREAT Public Relations**.
- ▶ EPA/DEQ **Recognition** through the National Partnership for Environmental Priorities (NPEP).

It Just Makes Sense



Up to 8 pound per meter



Not in our fish !