PETROGUARDIAN™ LLC

SAMPLE REPORT

Incident Report for:

Site Name: ---

Coordinates:

Sample Coordinates

Date/Time of Incident:

June 4th,2018, 01:00 HRS

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LIAS Report ID: 640
Delivery Date: 16 Jul 2018

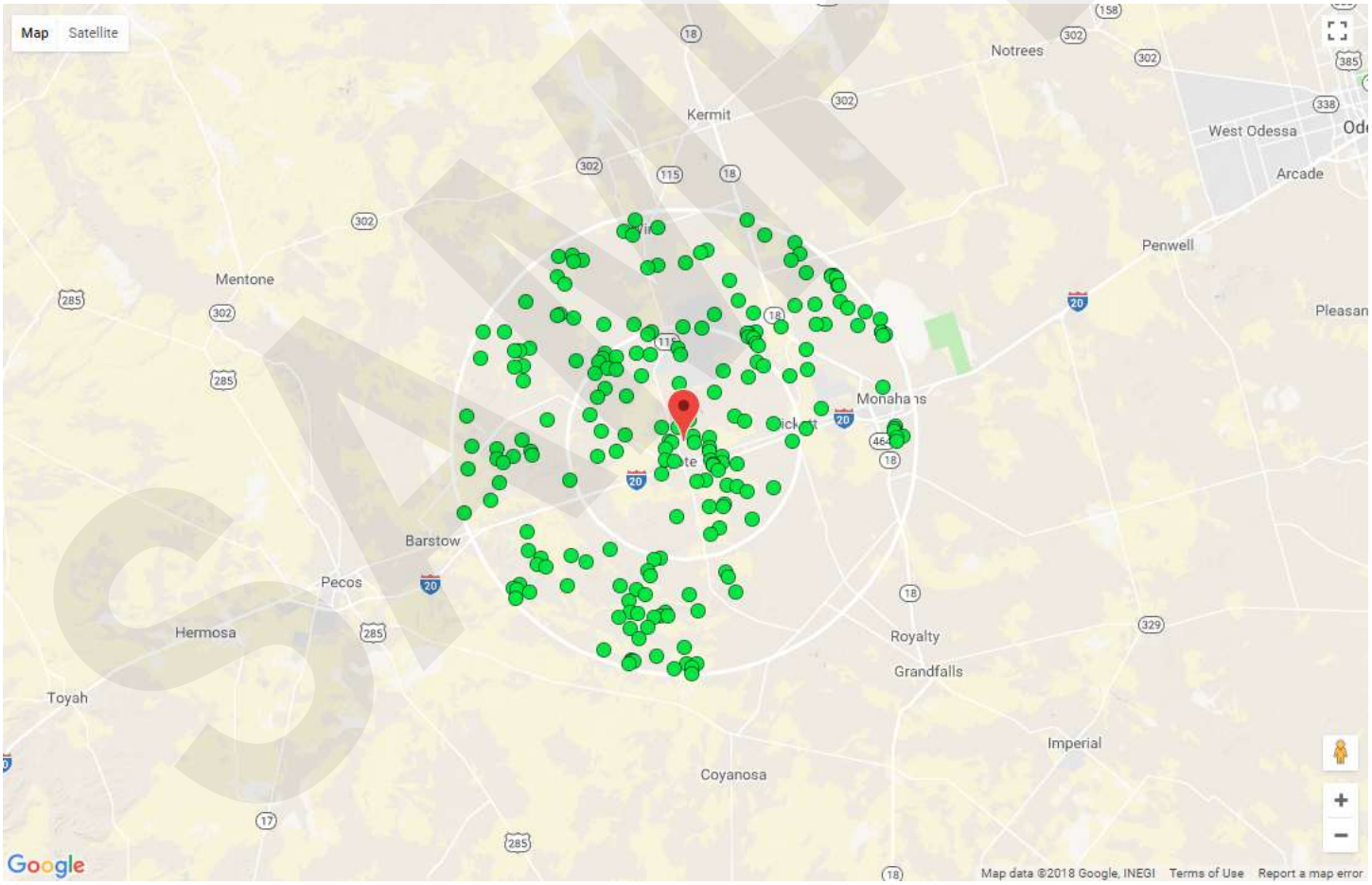
USPLN LIAS - Lightning Incident Archival Search Report

The United States Precision Lightning Network has provided the following lightning stroke detection information for the LIAS report.

LIAS Summary

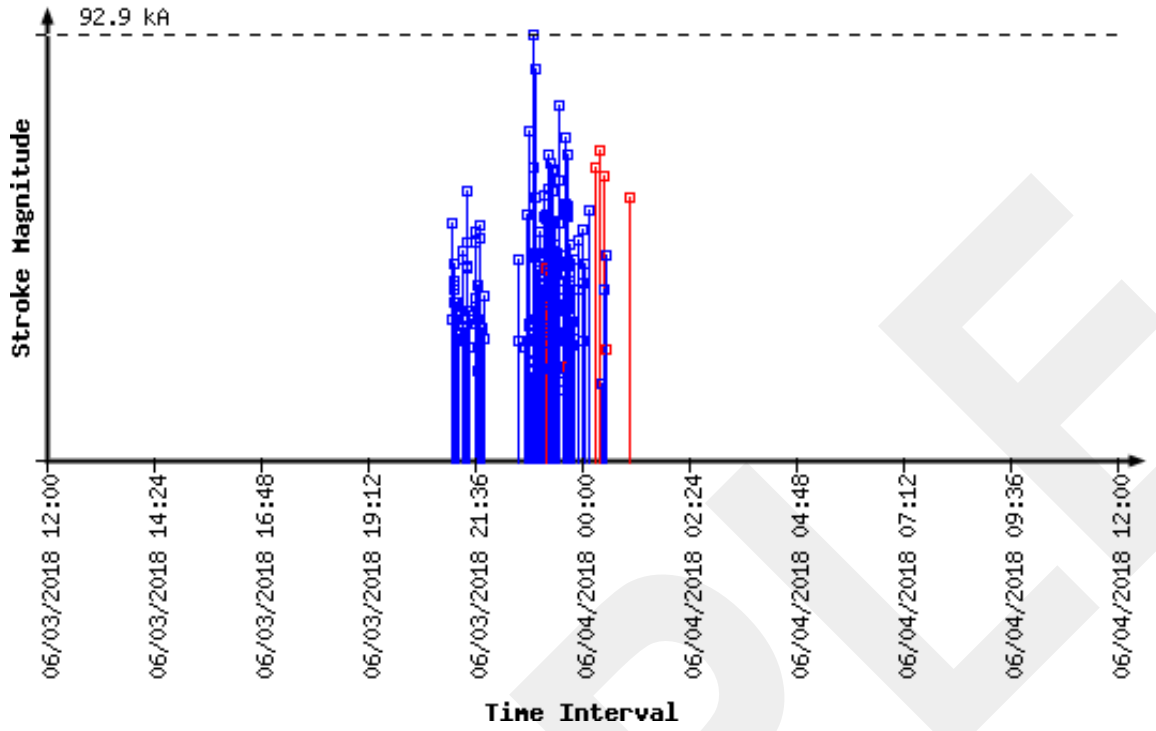
Customer Information	Sample Report
Search Parameters	Time: 06/03/2018, 12:00:00 to 06/04/2018, 12:00:00 Time Zone: Central Coords: Sample Coordinates Address: Sample Address
Results	215 cloud-to-ground events were detected by the USPLN

LIAS Stroke Map



CLICK HERE TO SEE THE WEATHER IN MOTION

LIAS Event Timeline



LIAS Result Parameters

LIAS Stroke Data

Date	Time	Latitude	Longitude	Amplitude(kA)	Distance(Miles)
06/03/2018	21:03:54	31.33690	-103.11085	-52.1	15.0
06/03/2018	21:04:50	31.34300	-103.11090	-31.2	14.6
06/03/2018	21:06:02	31.34669	-103.11653	-34.7	14.3
06/03/2018	21:07:17	31.34225	-103.12976	-39.5	14.6
06/03/2018	21:07:41	31.38107	-103.15916	-37.7	12.1
06/03/2018	21:07:41	31.39140	-103.14553	-38.5	11.3
06/03/2018	21:07:59	31.34673	-103.17930	-43.2	14.7
06/03/2018	21:09:15	31.35309	-103.14886	-28.3	14.0
06/03/2018	21:09:22	31.37949	-103.17830	-27.1	12.5
06/03/2018	21:11:12	31.34902	-103.17706	-32.4	14.5
06/03/2018	21:11:12	31.34973	-103.17657	-34.7	14.5
06/03/2018	21:11:13	31.34870	-103.17454	-27.8	14.5
06/03/2018	21:11:19	31.34702	-103.10570	-32.2	14.3
06/03/2018	21:11:47	31.37046	-103.16815	-26.7	13.0
06/03/2018	21:17:54	31.39053	-103.19083	-44.0	12.0
06/03/2018	21:18:33	31.39003	-103.15258	-31.2	11.5
06/03/2018	21:18:46	31.40545	-103.17904	-45.9	10.8
06/03/2018	21:18:46	31.41091	-103.16219	-26.7	10.2
06/03/2018	21:19:22	31.41526	-103.17069	-29.8	10.0
06/03/2018	21:20:29	31.39417	-103.14004	-28.3	11.1

06/03/2018	21:25:19	31.51531	-103.32058	-42.8	12.2
06/03/2018	21:25:20	31.53755	-103.32338	-42.4	12.1
06/03/2018	21:25:20	31.53996	-103.30608	-58.8	11.1
06/03/2018	21:25:20	31.54100	-103.28513	-47.9	9.8
06/03/2018	21:26:21	31.53386	-103.31712	-25.1	11.8
06/03/2018	21:26:21	31.54675	-103.32406	-32.8	12.1
06/03/2018	21:35:32	31.53603	-103.13897	-34.1	1.6
06/03/2018	21:36:33	31.54422	-103.28705	-35.9	9.9
06/03/2018	21:36:38	31.52404	-103.14397	-50.0	2.5
06/03/2018	21:36:46	31.53568	-103.12935	-47.7	1.3
06/03/2018	21:36:46	31.55259	-103.13228	-30.4	0.8
06/03/2018	21:36:46	31.56671	-103.12554	-34.1	1.0
06/03/2018	21:38:59	31.59620	-103.18261	-38.4	4.8
06/03/2018	21:39:41	31.58360	-103.12603	-19.8	2.2
06/03/2018	21:39:42	31.55395	-103.13517	-31.1	0.9
06/03/2018	21:40:22	31.55308	-103.10822	-26.6	0.7
06/03/2018	21:40:23	31.56729	-103.14430	-48.7	1.8
06/03/2018	21:40:35	31.54730	-103.14026	-25.3	1.3
06/03/2018	21:41:38	31.46936	-103.29133	-51.6	11.7
06/03/2018	21:45:55	31.72010	-103.11793	-29.2	11.6
06/03/2018	21:47:13	31.63513	-103.12321	-26.8	5.7
06/03/2018	21:48:24	31.59479	-103.21313	-36.1	6.3
06/03/2018	22:32:18	31.68064	-102.99810	-26.3	11.4
06/03/2018	22:33:02	31.63982	-102.98526	-44.1	10.0
06/03/2018	22:42:33	31.70580	-102.95260	-25.1	14.5
06/03/2018	22:44:07	31.66862	-103.23992	-54.1	10.7
06/03/2018	22:46:57	31.62930	-103.23670	-26.5	8.7
06/03/2018	22:47:19	31.74606	-103.17488	-30.2	13.8
06/03/2018	22:47:19	31.74882	-103.18487	-72.2	14.1
06/03/2018	22:48:25	31.69908	-102.95161	-20.0	14.2
06/03/2018	22:48:45	31.76027	-103.17238	-29.7	14.7
06/03/2018	22:50:24	31.67434	-102.92113	-18.0	14.4
06/03/2018	22:52:49	31.66109	-102.92974	-64.1	13.5
06/03/2018	22:52:49	31.75317	-103.14735	-21.9	14.0
06/03/2018	22:53:15	31.68397	-102.94815	-45.5	13.6
06/03/2018	22:53:36	31.49851	-103.33099	-30.1	13.1
06/03/2018	22:54:13	31.56556	-102.98518	-92.9	8.0
06/03/2018	22:54:51	31.66328	-102.96466	-44.5	11.9
06/03/2018	22:54:52	31.66243	-102.97425	-15.7	11.5
06/03/2018	22:55:00	31.70717	-103.25735	-22.1	13.5
06/03/2018	22:55:18	31.62072	-102.98460	-27.0	9.3
06/03/2018	22:55:36	31.72608	-103.25690	-45.0	14.5
06/03/2018	22:55:57	31.70866	-102.95501	-31.0	14.5
06/03/2018	22:55:57	31.69878	-102.94978	-18.7	14.2
06/03/2018	22:56:30	31.56814	-102.88872	-85.3	13.7
06/03/2018	22:57:27	31.67824	-102.93987	-57.6	13.7
06/03/2018	22:59:03	31.55362	-103.00040	-30.5	7.0
06/03/2018	22:59:06	31.53972	-103.21422	-42.0	5.7
06/03/2018	23:01:12	31.54897	-103.35132	-26.1	13.7
06/03/2018	23:02:24	31.71814	-103.14729	-40.9	11.6
06/03/2018	23:02:24	31.71484	-103.15902	-29.2	11.5

06/03/2018	23:02:33	31.63871	-103.29856	-50.1	12.2
06/03/2018	23:03:18	31.40778	-103.30329	-37.8	14.8
06/03/2018	23:03:19	31.42024	-103.29864	-41.7	14.0
06/03/2018	23:03:27	31.62310	-103.30511	-44.5	12.0
06/03/2018	23:03:28	31.55520	-103.29608	-38.7	10.4
06/03/2018	23:04:39	31.56318	-102.88912	-18.8	13.6
06/03/2018	23:04:39	31.55405	-102.88664	-25.3	13.8
06/03/2018	23:04:39	31.55795	-102.88690	-30.7	13.7
06/03/2018	23:04:39	31.56591	-102.88987	-18.2	13.6
06/03/2018	23:04:39	31.55906	-102.88028	-31.2	14.1
06/03/2018	23:05:15	31.63117	-103.34189	-38.6	14.2
06/03/2018	23:07:02	31.41583	-103.30230	-19.4	14.4
06/03/2018	23:07:02	31.41718	-103.30647	-25.8	14.5
06/03/2018	23:07:52	31.57404	-103.26942	-58.0	9.0
06/03/2018	23:07:53	31.57779	-103.35607	-53.4	14.1
06/03/2018	23:07:53	31.61051	-103.29523	-32.3	11.1
06/03/2018	23:09:44	31.41367	-103.28821	-45.4	13.9
06/03/2018	23:09:44	31.43903	-103.28009	-34.0	12.4
06/03/2018	23:11:14	31.48781	-103.35999	-19.3	14.9
06/03/2018	23:11:35	31.67172	-103.08667	-52.8	8.5
06/03/2018	23:12:01	31.63771	-103.30500	-26.7	12.4
06/03/2018	23:12:01	31.62439	-103.29505	-33.4	11.5
06/03/2018	23:12:01	31.65518	-103.31564	-21.5	13.6
06/03/2018	23:12:01	31.64002	-103.28744	-53.9	11.6
06/03/2018	23:12:23	31.43742	-103.27019	-27.5	12.0
06/03/2018	23:12:23	31.52818	-103.35551	42.4	14.1
06/03/2018	23:12:35	31.62797	-103.21215	-59.5	7.6
06/03/2018	23:12:35	31.61724	-103.21693	-35.5	7.3
06/03/2018	23:12:38	31.66007	-103.12062	-29.8	7.4
06/03/2018	23:12:38	31.65895	-103.10031	-40.7	7.5
06/03/2018	23:12:42	31.44694	-103.24295	-47.3	10.4
06/03/2018	23:12:42	31.45176	-103.28956	-66.9	12.3
06/03/2018	23:12:46	31.65600	-103.33909	-25.8	14.8
06/03/2018	23:12:59	31.51747	-103.24380	-34.5	7.8
06/03/2018	23:13:50	31.44108	-103.22591	-29.0	10.0
06/03/2018	23:13:53	31.72912	-103.10138	-39.3	12.3
06/03/2018	23:14:23	31.66290	-103.20665	-28.7	9.2
06/03/2018	23:14:23	31.62029	-103.19361	-49.9	6.4
06/03/2018	23:14:33	31.44538	-103.27593	-36.9	11.9
06/03/2018	23:15:50	31.72656	-103.24195	-50.4	14.1
06/03/2018	23:15:50	31.72170	-103.24014	-20.6	13.7
06/03/2018	23:15:50	31.72192	-103.23086	-39.6	13.5
06/03/2018	23:17:14	31.57885	-103.22155	-65.1	6.3
06/03/2018	23:17:17	31.43346	-103.15923	-37.6	8.6
06/03/2018	23:18:29	31.63624	-103.20574	-59.2	7.7
06/03/2018	23:18:29	31.63248	-103.19376	-63.5	7.1
06/03/2018	23:19:09	31.51013	-103.02153	-34.4	6.5
06/03/2018	23:19:25	31.55938	-103.18400	-45.9	3.8
06/03/2018	23:19:40	31.63062	-103.20802	-19.2	7.5
06/03/2018	23:19:40	31.60262	-103.20613	-41.1	6.2
06/03/2018	23:19:55	31.50666	-103.05055	-20.2	5.2

06/03/2018	23:20:12	31.67221	-103.25537	-25.9	11.5
06/03/2018	23:20:12	31.57285	-103.05340	-45.0	4.1
06/03/2018	23:20:12	31.57047	-103.02089	-52.2	6.0
06/03/2018	23:20:44	31.56354	-103.20998	-26.0	5.4
06/03/2018	23:20:50	31.68381	-103.29180	-25.2	13.7
06/03/2018	23:20:57	31.57680	-103.06430	-17.4	3.7
06/03/2018	23:21:05	31.62174	-103.20224	-42.4	6.8
06/03/2018	23:21:24	31.66704	-102.90527	-52.5	14.9
06/03/2018	23:22:20	31.73857	-102.99862	-28.2	14.7
06/03/2018	23:22:20	31.72871	-102.99321	-26.9	14.3
06/03/2018	23:22:21	31.70862	-102.95771	-29.2	14.4
06/03/2018	23:22:31	31.36240	-103.11906	-25.8	13.2
06/03/2018	23:22:49	31.54507	-103.19305	-40.6	4.4
06/03/2018	23:22:56	31.54426	-103.09141	-47.3	1.8
06/03/2018	23:23:03	31.51712	-103.09609	-45.3	2.8
06/03/2018	23:23:03	31.55901	-103.10934	-36.1	0.7
06/03/2018	23:23:18	31.63587	-103.17169	-45.9	6.5
06/03/2018	23:23:19	31.63515	-103.15639	-29.4	6.1
06/03/2018	23:23:19	31.61433	-103.16620	-43.3	5.1
06/03/2018	23:24:41	31.61902	-103.07609	-27.7	5.3
06/03/2018	23:24:55	31.65327	-103.15890	-45.7	7.4
06/03/2018	23:24:55	31.65539	-103.15430	-28.5	7.4
06/03/2018	23:26:15	31.61356	-103.04914	-40.8	5.9
06/03/2018	23:27:03	31.65548	-102.90337	-15.7	14.6
06/03/2018	23:27:03	31.65595	-102.90395	-17.6	14.6
06/03/2018	23:27:04	31.65185	-102.90259	-26.7	14.5
06/03/2018	23:27:27	31.64021	-103.12656	-20.6	6.1
06/03/2018	23:27:27	31.60751	-103.12508	-61.3	3.8
06/03/2018	23:27:54	31.55713	-103.09134	-27.7	1.7
06/03/2018	23:27:55	31.57428	-103.11394	-17.8	1.5
06/03/2018	23:27:55	31.57486	-103.11431	-19.7	1.6
06/03/2018	23:29:22	31.41938	-103.24610	-77.5	11.9
06/03/2018	23:29:23	31.45290	-103.20050	-52.2	8.4
06/03/2018	23:29:31	31.67069	-103.25772	-39.7	11.6
06/03/2018	23:29:31	31.59930	-103.08648	-42.9	3.8
06/03/2018	23:33:30	31.75943	-103.05073	-35.7	14.9
06/03/2018	23:36:26	31.53456	-103.07768	-54.5	2.8
06/03/2018	23:36:26	31.52659	-103.08185	-45.1	2.9
06/03/2018	23:36:27	31.51289	-103.07271	-56.2	3.9
06/03/2018	23:37:21	31.53176	-103.08789	-34.5	2.4
06/03/2018	23:37:21	31.53232	-103.08793	-26.8	2.3
06/03/2018	23:37:21	31.53963	-103.07828	-32.9	2.6
06/03/2018	23:37:21	31.53305	-103.06111	-43.1	3.7
06/03/2018	23:37:21	31.53648	-103.08975	-20.9	2.1
06/03/2018	23:37:22	31.53178	-103.08729	-42.8	2.4
06/03/2018	23:38:16	31.68467	-103.06033	-70.4	9.8
06/03/2018	23:38:32	31.65526	-103.04071	-54.9	8.5
06/03/2018	23:38:32	31.64567	-103.04049	-33.9	8.0
06/03/2018	23:38:33	31.62380	-103.03279	-37.1	7.1
06/03/2018	23:38:33	31.62747	-103.03969	-53.2	7.0
06/03/2018	23:39:05	31.54816	-103.09188	20.8	1.7

06/03/2018	23:39:38	31.66034	-103.01336	-43.8	9.7
06/03/2018	23:39:38	31.67286	-103.04368	-67.0	9.5
06/03/2018	23:39:38	31.64340	-103.03849	-55.7	7.9
06/03/2018	23:39:38	31.64936	-103.04311	-53.8	8.1
06/03/2018	23:40:19	31.51156	-103.06120	-42.9	4.5
06/03/2018	23:40:32	31.42760	-103.07060	-36.7	9.1
06/03/2018	23:40:32	31.41303	-103.06295	-42.6	10.3
06/03/2018	23:41:50	31.70336	-103.06999	-32.1	10.8
06/03/2018	23:41:50	31.73185	-103.09457	-19.5	12.5
06/03/2018	23:41:54	31.65086	-103.04954	-30.1	8.0
06/03/2018	23:41:54	31.65481	-103.04924	-23.4	8.2
06/03/2018	23:41:55	31.65458	-103.05092	-19.4	8.1
06/03/2018	23:42:17	31.49268	-103.09227	-19.8	4.5
06/03/2018	23:42:17	31.46686	-103.08996	-31.8	6.2
06/03/2018	23:42:34	31.49495	-103.07485	-38.4	4.8
06/03/2018	23:42:56	31.43253	-103.07375	-34.6	8.8
06/03/2018	23:43:06	31.66263	-103.17398	-47.3	8.3
06/03/2018	23:43:47	31.49356	-103.07673	-18.7	4.8
06/03/2018	23:43:47	31.48176	-103.04517	-39.3	6.6
06/03/2018	23:43:47	31.74541	-103.03168	-29.3	14.3
06/03/2018	23:43:47	31.47313	-103.08053	-29.8	6.0
06/03/2018	23:44:12	31.72230	-103.00287	-25.7	13.6
06/03/2018	23:44:51	31.69967	-103.24975	-30.6	12.8
06/03/2018	23:47:22	31.51625	-103.10517	-28.7	2.7
06/03/2018	23:47:45	31.42901	-103.15555	-44.3	8.8
06/03/2018	23:47:52	31.70707	-102.95807	-25.7	14.3
06/03/2018	23:49:27	31.68200	-102.97565	-27.1	12.3
06/03/2018	23:54:07	31.48360	-103.12665	-37.5	4.8
06/03/2018	23:55:14	31.58384	-102.96914	-48.4	9.1
06/03/2018	23:58:46	31.41981	-103.18954	-26.7	10.1
06/03/2018	23:58:46	31.39503	-103.17820	-38.8	11.5
06/03/2018	23:58:47	31.39387	-103.16952	-50.7	11.4
06/04/2018	00:02:54	31.41065	-103.11293	-43.0	9.9
06/04/2018	00:08:32	31.61503	-103.00336	-54.7	8.1
06/04/2018	00:18:22	31.39540	-103.10337	64.0	11.0
06/04/2018	00:22:30	31.60394	-102.90246	67.9	13.3
06/04/2018	00:26:00	31.36008	-103.20637	-17.3	14.3
06/04/2018	00:27:32	31.65290	-102.89995	62.4	14.7
06/04/2018	00:30:06	31.39083	-103.13726	-37.4	11.3
06/04/2018	00:32:05	31.44385	-103.15240	24.5	7.8
06/04/2018	00:32:05	31.44488	-103.14578	-45.1	7.6
06/04/2018	01:02:59	31.71075	-102.98650	57.4	13.5

PETROGUARDIAN™ LLC

About Petro Guardian

Engineered Protection for Oilfield Assets

Petro Guardian, LLC. is a lightning protection company that uses scientific theory as well as over 20 years of field experience to design custom solutions to shield people, places and sensitive electrical and electronic equipment from the damaging effects of lightning strikes. We have applied our knowledge as lightning protection professionals to protect everything from critical logic controllers for petrochemical plants to upstream/midstream/downstream oil and gas processes, retrofitting protection equipment into/onto existing structures and incorporating solutions into the design and building phases.

CLICK HERE FOR OUR EXPLAINER VIDEO

Our Customers
In addition to SWD companies like Mesquite SWD, Probity, Pyote and Aquaterra Inc., Petro Guardian has had the privilege to work with customers such as the U.S. military, Chesapeake Energy, DuPont, Exxon-Mobil, Motiva, Noble Drilling, NASA, ConocoPhillips, Pioneer Resources, Parsley Energy, Concho Energy, Hunt Oil, XTO, Google and others. Often, Petro Guardian operates under exclusive Master Service Agreements and is designated as the recommended lightning protection consultant. We have designed and installed over 30,000 commercial and industrial facilities for protection of people, property and processes from risks of direct and indirect lightning strikes.

Quality Statement
Petro Guardian is a recognized global manufacturer headquartered in the USA. We have been dedicated to the field of lightning protection since 1997. We offer an array of products and engineered solutions to meet specific needs and requirements. We are committed to continuous improvement and service through continued research and development. Testing in laboratory environments allows us to maintain quality product lines and manufacturing processes. Using the latest manufacturing technology available assures delivery of premium products to our customers. We affiliate our growth with research scientists, practicing engineering consultants and vested employees.

Health Safety & Environment
Protection of people and the environment is our core value. It is our vision to create a culture within Petro Guardian, LLC that empowers employees to drive this value into all operations and achieve excellence in health, safety, and environmental (HSE) performance. Our objective is to meet or exceed the expectations of regulators, customers, and our own internal standards. Beyond compliance, we are committed to continuous improvement across all of our areas of operation.

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National Standards
Petro Guardian's lightning protection systems are designed to the relevant standards including:
NFPA 780; NFPA 77; UL 96A; API 545; API 650; API 2003; FAASTD-019e; IEEE std 142; IEEE std 1100; NASA KSC-STD-E-0012E; Air Force 1065; NAVSEA OP 5; IEC std 62305; NFC 17-102. Petro Guardian provides OEM installation In addition to the national standards, PetroGuardian has developed an industry best practices document.

Key Milestones

- Expanded into industrial and Oil & Gas in 2003
- Started developing proprietary products and developed standards for Oil & Gas in 2012
- Renamed under the Petro Guardian brand in 2015
- Founded 4LP in 2015 for residential and commercial Lightning Protection Systems
- In 2016 began manufacturing a full line of UL listed lightning protection parts
- In 2017, Petro Guardian was awarded US Patent (No. 9,540,170 B2) for the Static Lasso®, an in-tank static suppression and collection device used in production and disposal storage tanks to prevent static-induced fires
- Founded SineUp 2017 (Lightning surge protection for electrical systems)
- Founded Relyon 2017 (Lightning strike predictive and warning system, Thor Guard® exclusive regional distributor)
- Founded Lythix in 2017 (Power distribution design services)

PETROGUARDIAN™ LLC

Services Provided

Petro Guardian engineers systems to protect oil and gas assets from damage caused by lightning strikes and static discharge. In addition, Petro Guardian works with operators to develop a standardized plan for preventing ignition from lightning strikes and static discharge. Each plan incorporates and complies with standards for lightning protection and static mitigation, including NFPA, IEEE, API, and IEC.

Static Protection
A static protection system controls ignition hazards from static electricity by neutralizing the charges in the fluid and vapors inside fiberglass and lined steel tanks. Static protection is focused on points across the lid and flange of thief hatches, during fluid exchange at truck load out stations, and inside fiberglass tanks or lined steel tanks.

Lightning Protection
Flammable vapors ignite from small sparks caused by nearby lightning events. The process of a lightning event is associated with a rising and falling electromagnetic field. Electrical conductors within this field are stressed, as voltage from one point to other rises, a flow of current is induced. If metal structures on a production site are not adequately bonded to each other and adequately grounded, arcing and current flashover occurs across the structures. Voltage stress on structures can attain high values that generate upward leaders (also known as streamers). These events can ignite flammable vapors.

Lightning Surge Protection
Lightning discharges will produce electromagnetic pulses that can be coupled onto conductors servicing the structure. The discharges on power utility lines directly induce transients into the power feed. The discharges also lead to a rise in ground potential and are a source for ground transients. These induced transients can cause dangerous over-voltages, resulting in damage to critical electrical and electronic hardware. Surge protection devices protect facilities against induced surges on power, communication, data and process control lines.

Inspection and Preventative Maintenance
It is recommended that protected facilities are inspected every winter (at a minimum) to allow time to make the discovered recommended repairs before the spring storms arrive. Damage to the integrity of the protection system could result from natural causes such as H2S or chloride corrosion, wind storms, hail and more. Man-made damage could result from theft of material, painting, or replacement of parts that may damage or disconnect bonding and grounding components. Inspections should also identify any equipment that has been added to the facility after the original installation which, if left unprotected, jeopardizes the entire protection system.

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