

LIGHTNING SAFETY IN REMOTE AREAS

by National Lightning Safety Institute (NLSI), www.lightningsafety.com

Problem: None of the typical and usual lightning safety locations exist. No fully-enclosed metal vehicles or no large permanent buildings are nearby. Outdoor workers may be exposed to lightning hazards. How to reduce this vulnerability, in advance, with one or more “out-of-the-box” solutions?

Risk Reduction: Absolute and assured 100% safety from lightning may be impossible. This is due to the random, stochastic and unpredictable behavior of each single atmospheric electrical event. Further, while the statistical probability of loss may be low, the consequences in terms of loss of life and/or loss of productivity may be unacceptable. There is no single, all-encompassing defense against the threat. Lightning safety measures are very site-specific. Most important, a systematic approach incorporating several related topics, is vital.

Example: Field crews such as archeology, biology, geology and other scientific applications. See the following *NLSI LIGHTNING SAFETY ADVISORY*. Modify this document as is appropriate for your activities.

NLSI LIGHTNING SAFETY ADVISORY

Lightning Safety for Scientific Field Activities

by National Lightning Safety Institute (NLSI), www.lightningsafety.com

1.0 Overview of the Lightning Attachment Mechanism and Defenses.

1.1 SITUATION A - Direct First Strike with No Prior Warning. There is no defense whatsoever.

1.2 SITUATION B - Storm is approaching. Lightning is seen. Thunder is heard - this often can indicate an Orange Alert. Defense: Enact Safety Procedures.

1.2.1 Use the best available lightning detector to indicate threat proximity, or

1.2.2 Using "Flash-to-Bang" measurement, estimate the proximity of lightning. For each 5 seconds from **Seeing Lightning** to hearing the associated **Thunder**, lightning is .6km (1 mile) away. Count of 10 = 1.2km (2 miles); 15 = 1.8km (3 miles); 25 = 15km (5 miles); etc.

1.2.3 Lightning Alert Colors are:

1.2.3.1 Yellow is 30-60 km (20-37 miles) range = THREAT IS APPROACHING.

1.2.3.2 Orange is 16-30 km (11-19 miles) range = PREPARE DEFENSES.

1.2.3.3 Red is 00-16 km (00-10 miles) range = BE AT MAXIMUM SAFETY.

1.3 SITUATION C - Indirect Strike Dangers.

1.3.1 Step Voltages. You become a lightning conductor when your feet intercept close-in ground voltages. Defense: Equipotentialization by means of standing on metal mesh. Remote crews to have packable .5X.5m (18X18 inch) thin galv. steel grid.

1.3.2 Touch Voltage. Lightning energizes a conductor (fence, tree, equipment, etc.) with which you are in contact. You become a part of the electrical circuit. Defense: Avoid proximity to possible conductors.

2.0 Best Alternative Protection Procedures (Partial List) are:

2.1 Get into a fully enclosed metal vehicle. This means an all metal car, truck, bus or heavy equipment with ROPS canopy. A metal shipping container is a good refuge. Consider customized shelters such as 1) helicopter transportable, quickly erected, sectional metal mesh shelters and 2) pole-supported overhead shield wires for semi-permanent fabric camp tents. See the company Subject Matter Experts for details before proceeding.

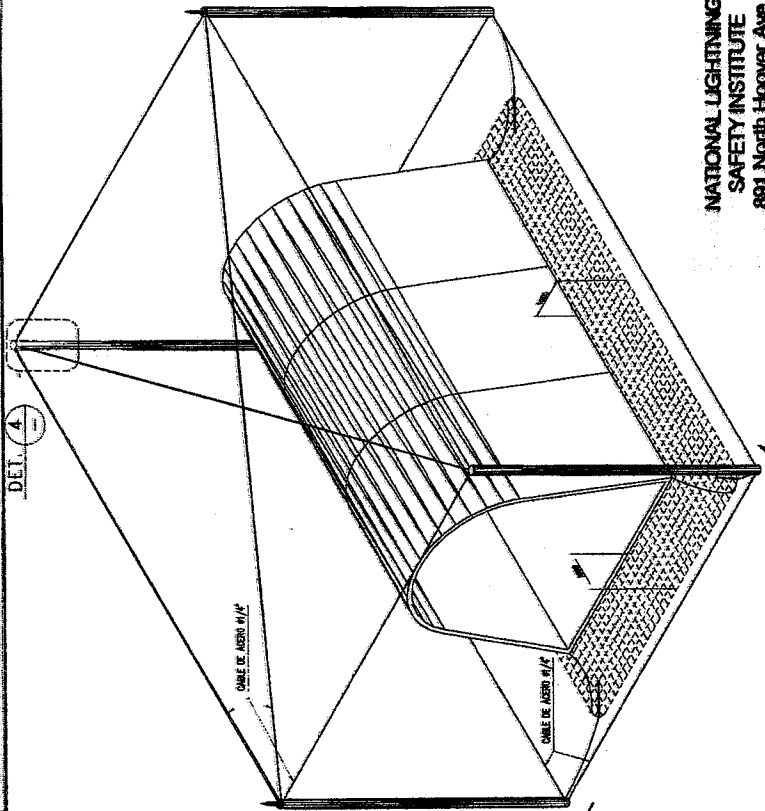
2.2 AVOID the following locations: the high elevations; bare ground; metal; water; solitary trees; open fields; electrical equipment and other conductors. When hopelessly isolated, separate people a min. distance of 15 m (50 ft) to reduce multiple injuries.

3.0 Risk Analysis. Most exploration sites are at risk from lightning. There is less risk of lightning above approx. 50 degrees North/South of the Equator and during low lightning seasonal activity. Variances to the Safety Plan may be granted under some circumstances.



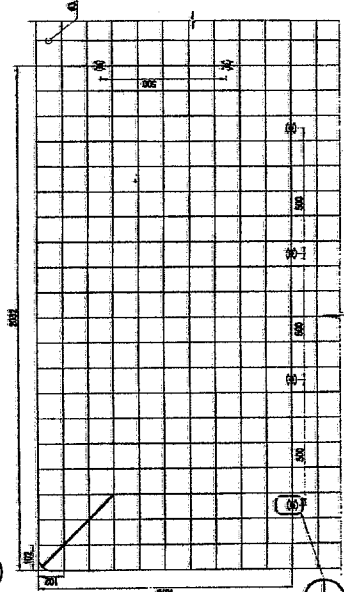
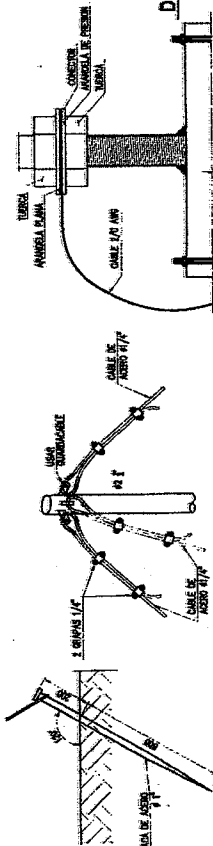
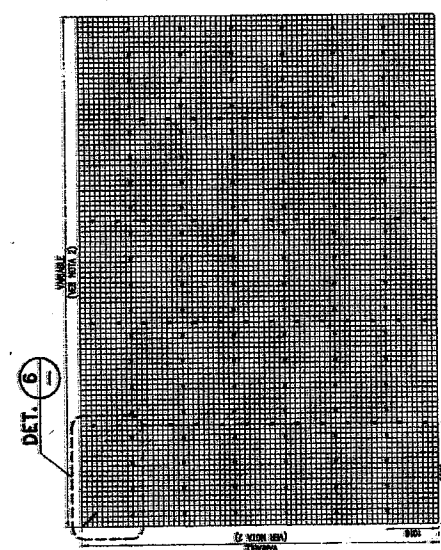
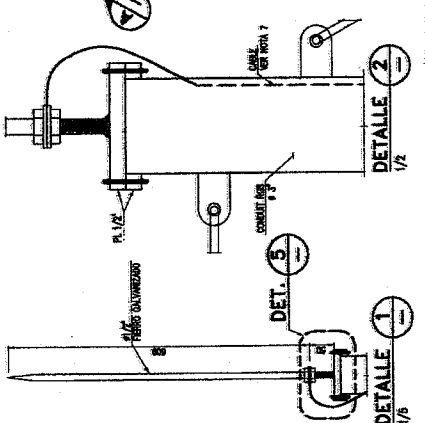
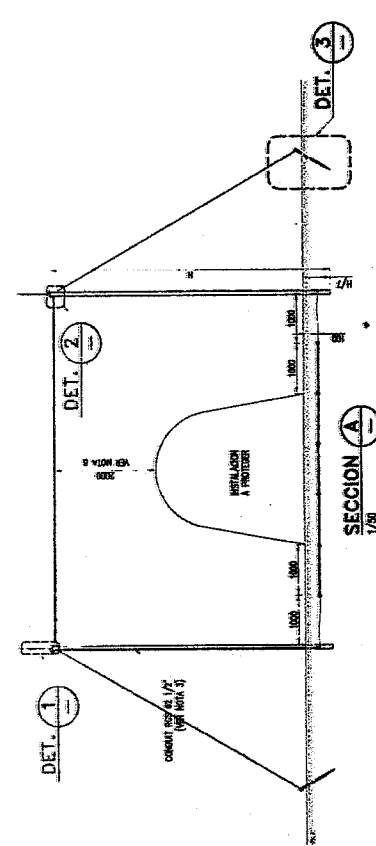
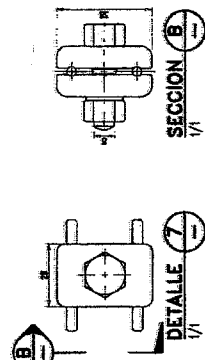
05/03/2008 12:01

NATIONAL LIGHTNING
SAFETY INSTITUTE
891 North Hoover Ave.
Louisville CO 80027-2294



NATIONAL LIGHTNING
SAFETY INSTITUTE
891 North Hoover Ave.
Louisville CO 80027-2294

- NOTAS:
1. LAS DIMENSIONES ESTAN EN PULGADAS.
 2. LAS DIMENSIONES ESTAN EN METROS.
 3. LAS DIMENSIONES ESTAN EN METROS.
 4. ALTERNATIVA DE CABLE DE ASERIO PARA USO EN EL MAR.
 5. ALTERNATIVA DE CABLE DE ASERIO PARA USO EN EL MAR.



PLANO No.		NOMBRE DE REPRESENTACION		DESCRIPCION DE LA REPRESENTACION	
1	1/10	1	1/10	1	1/10
2	1/10	2	1/10	2	1/10
3	1/10	3	1/10	3	1/10
4	1/10	4	1/10	4	1/10
5	1/10	5	1/10	5	1/10
6	1/10	6	1/10	6	1/10
7	1/10	7	1/10	7	1/10
8	1/10	8	1/10	8	1/10
9	1/10	9	1/10	9	1/10
10	1/10	10	1/10	10	1/10
11	1/10	11	1/10	11	1/10
12	1/10	12	1/10	12	1/10
13	1/10	13	1/10	13	1/10
14	1/10	14	1/10	14	1/10
15	1/10	15	1/10	15	1/10
16	1/10	16	1/10	16	1/10
17	1/10	17	1/10	17	1/10
18	1/10	18	1/10	18	1/10
19	1/10	19	1/10	19	1/10
20	1/10	20	1/10	20	1/10
21	1/10	21	1/10	21	1/10
22	1/10	22	1/10	22	1/10
23	1/10	23	1/10	23	1/10
24	1/10	24	1/10	24	1/10
25	1/10	25	1/10	25	1/10
26	1/10	26	1/10	26	1/10
27	1/10	27	1/10	27	1/10
28	1/10	28	1/10	28	1/10
29	1/10	29	1/10	29	1/10
30	1/10	30	1/10	30	1/10
31	1/10	31	1/10	31	1/10
32	1/10	32	1/10	32	1/10
33	1/10	33	1/10	33	1/10
34	1/10	34	1/10	34	1/10
35	1/10	35	1/10	35	1/10
36	1/10	36	1/10	36	1/10
37	1/10	37	1/10	37	1/10
38	1/10	38	1/10	38	1/10
39	1/10	39	1/10	39	1/10
40	1/10	40	1/10	40	1/10
41	1/10	41	1/10	41	1/10
42	1/10	42	1/10	42	1/10
43	1/10	43	1/10	43	1/10
44	1/10	44	1/10	44	1/10
45	1/10	45	1/10	45	1/10
46	1/10	46	1/10	46	1/10
47	1/10	47	1/10	47	1/10
48	1/10	48	1/10	48	1/10
49	1/10	49	1/10	49	1/10
50	1/10	50	1/10	50	1/10
51	1/10	51	1/10	51	1/10
52	1/10	52	1/10	52	1/10
53	1/10	53	1/10	53	1/10
54	1/10	54	1/10	54	1/10
55	1/10	55	1/10	55	1/10
56	1/10	56	1/10	56	1/10
57	1/10	57	1/10	57	1/10
58	1/10	58	1/10	58	1/10
59	1/10	59	1/10	59	1/10
60	1/10	60	1/10	60	1/10
61	1/10	61	1/10	61	1/10
62	1/10	62	1/10	62	1/10
63	1/10	63	1/10	63	1/10
64	1/10	64	1/10	64	1/10
65	1/10	65	1/10	65	1/10
66	1/10	66	1/10	66	1/10
67	1/10	67	1/10	67	1/10
68	1/10	68	1/10	68	1/10
69	1/10	69	1/10	69	1/10
70	1/10	70	1/10	70	1/10
71	1/10	71	1/10	71	1/10
72	1/10	72	1/10	72	1/10
73	1/10	73	1/10	73	1/10
74	1/10	74	1/10	74	1/10
75	1/10	75	1/10	75	1/10
76	1/10	76	1/10	76	1/10
77	1/10	77	1/10	77	1/10
78	1/10	78	1/10	78	1/10
79	1/10	79	1/10	79	1/10
80	1/10	80	1/10	80	1/10
81	1/10	81	1/10	81	1/10
82	1/10	82	1/10	82	1/10
83	1/10	83	1/10	83	1/10
84	1/10	84	1/10	84	1/10
85	1/10	85	1/10	85	1/10
86	1/10	86	1/10	86	1/10
87	1/10	87	1/10	87	1/10
88	1/10	88	1/10	88	1/10
89	1/10	89	1/10	89	1/10
90	1/10	90	1/10	90	1/10
91	1/10	91	1/10	91	1/10
92	1/10	92	1/10	92	1/10
93	1/10	93	1/10	93	1/10
94	1/10	94	1/10	94	1/10
95	1/10	95	1/10	95	1/10
96	1/10	96	1/10	96	1/10
97	1/10	97	1/10	97	1/10
98	1/10	98	1/10	98	1/10
99	1/10	99	1/10	99	1/10
100	1/10	100	1/10	100	1/10

Overhead shield wire air terminal design for fabric-type man tents. No more than 50-60% efficiency is claimed. All-metal shipping containers provide 90-95% efficiency and should be used where practical in place of this design.