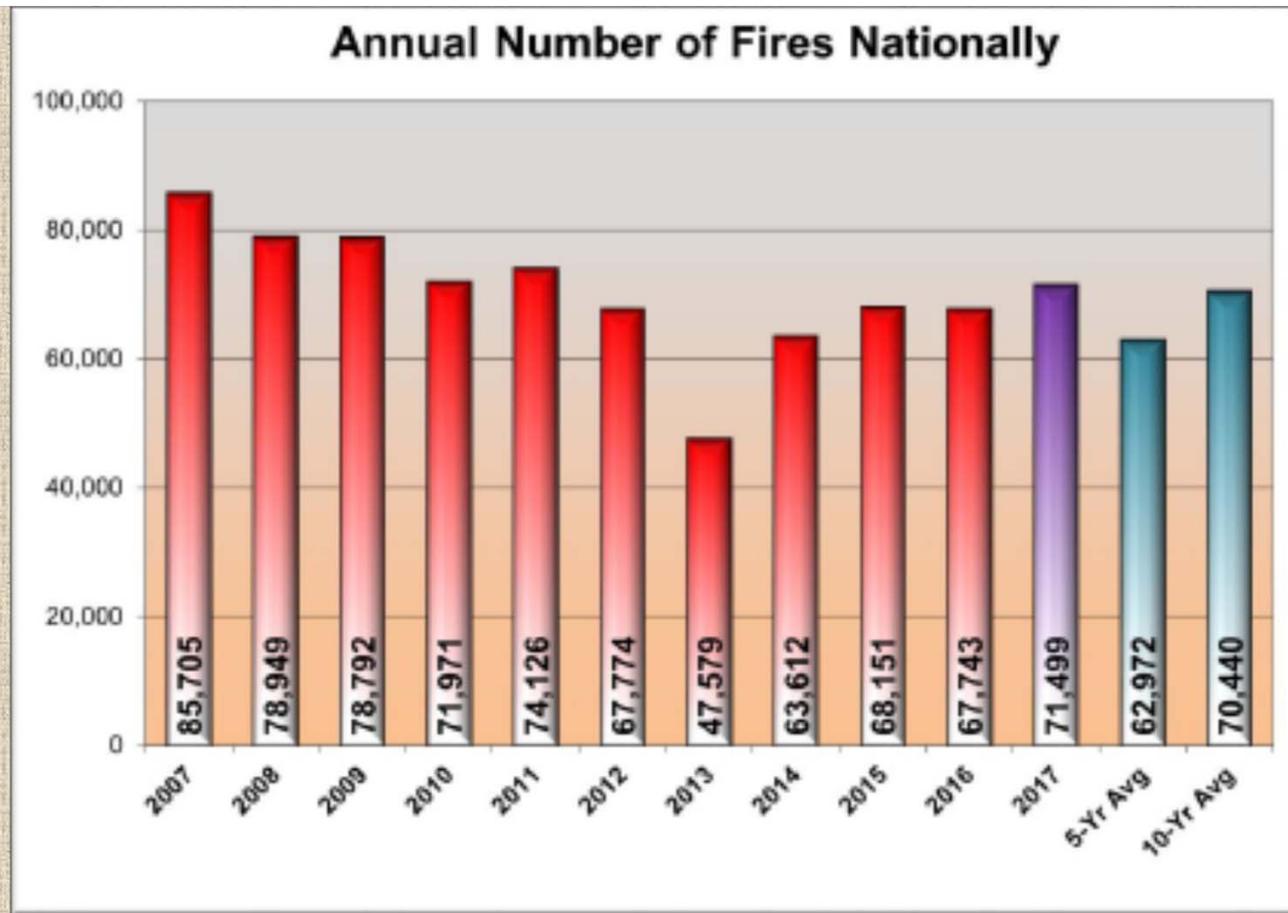




**JULY WILDFIRE, ZORTMAN-LANDUSKY MINE
BY BILL MAEHL, SPECTRUM ENGINEERING
AND ENVIRONMENTAL LLC**

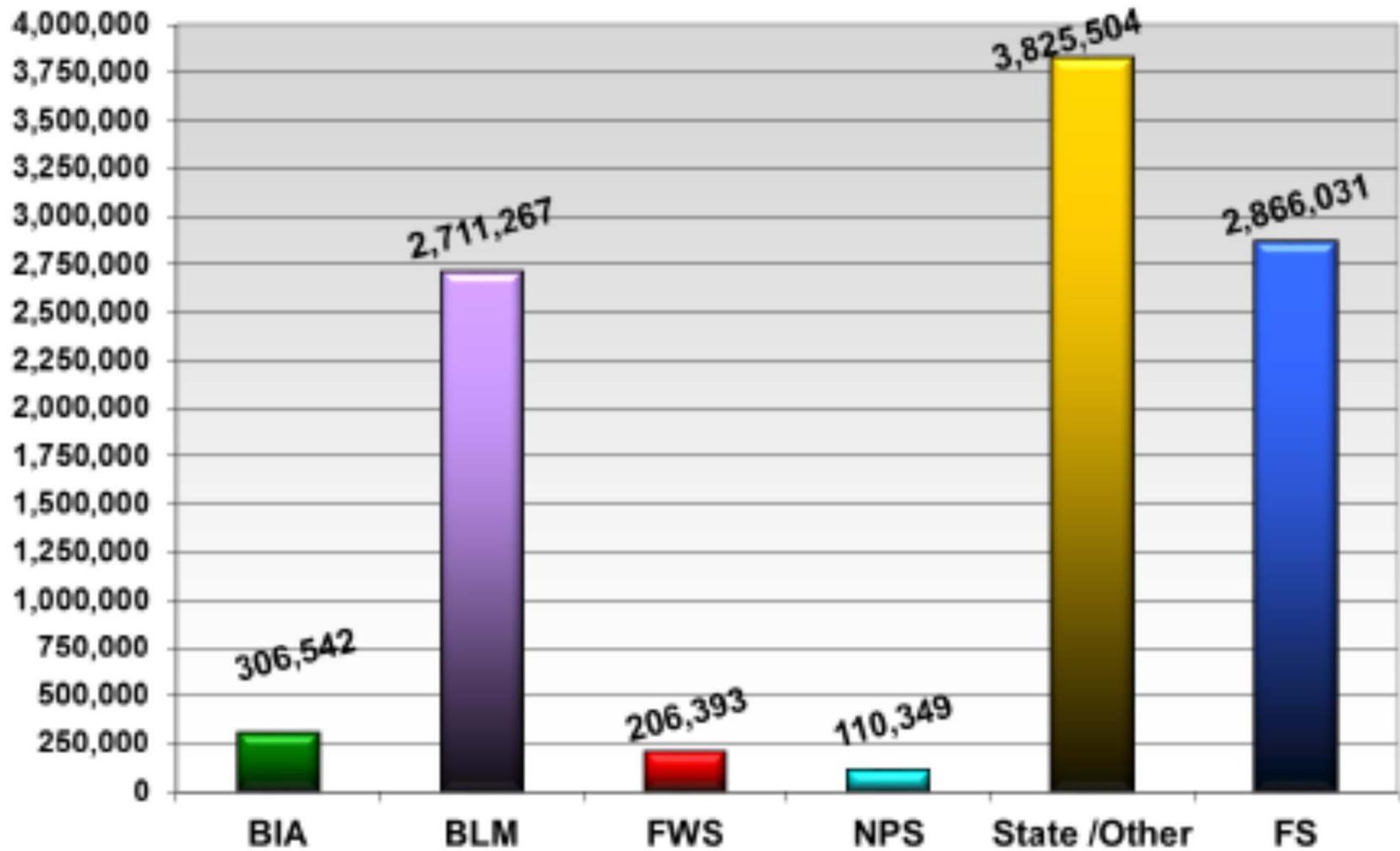
2018 MINE DESIGN, OPERATIONS, AND CLOSURE CONFERENCE



Wildfires Reported to NICC

In 2017 there were 71,499 wildfires in the U.S., which burned 10,026,086 acres. Fires reported and acres burned were well above the five year average and slightly higher than the 10 year national average.

Number of Burned Acres by Agency - 2017



2017 with 10,026,086
acres at a cost of
\$2,918,165,000

2016 with 5,503,538
acres at a cost of
\$1,975,545,000

Federal Firefighting Costs (Suppression Only)

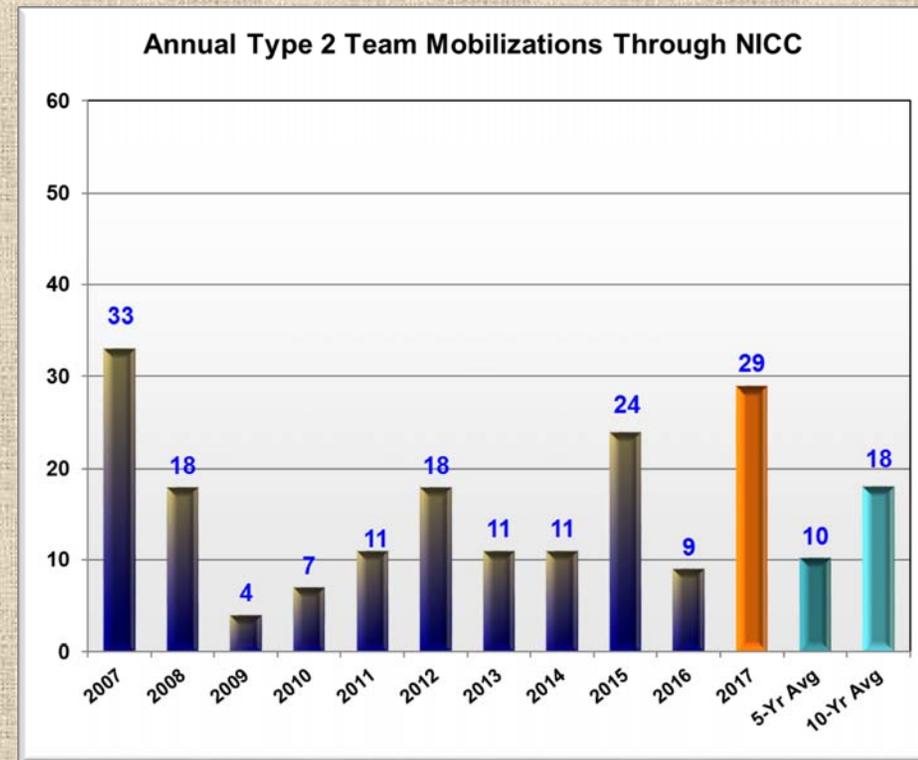
Year	Fires	Acres	Forest Service	DOI Agencies	Total
1985	82,591	2,896,147	\$161,505,000	\$78,438,000	\$239,943,000
1986	85,907	2,719,162	\$111,625,000	\$91,153,000	\$202,778,000
1987	71,300	2,447,296	\$253,657,000	\$81,452,000	\$335,109,000
1988	72,750	5,009,290	\$429,609,000	\$149,317,000	\$578,926,000
1989	48,949	1,827,310	\$331,672,000	\$168,115,000	\$499,787,000
1990	66,481	4,621,621	\$253,700,000	\$144,252,000	\$397,952,000
1991	75,754	2,953,578	\$132,300,000	\$73,820,000	\$206,120,000
1992	87,394	2,069,929	\$290,300,000	\$87,166,000	\$377,466,000
1993	58,810	1,797,574	\$184,000,000	\$56,436,000	\$240,436,000
1994	79,107	4,073,579	\$757,200,000	\$161,135,000	\$918,335,000
1995	82,234	1,840,546	\$367,000,000	\$110,126,000	\$477,126,000
1996	96,363	6,065,998	\$547,500,000	\$153,683,000	\$701,183,000
1997	66,196	2,856,959	\$179,100,000	\$105,048,000	\$284,148,000
1998	81,043	1,329,704	\$306,800,000	\$109,904,000	\$416,704,000
1999	92,487	5,626,093	\$361,100,000	\$154,416,000	\$515,516,000
2000	92,250	7,383,493	\$1,076,000,000	\$334,802,000	\$1,410,802,000
2001	84,079	3,570,911	\$683,122,000	\$269,574,000	\$952,696,000
2002	73,457	7,184,712	\$1,279,000,000	\$395,040,000	\$1,674,040,000
2003	63,629	3,960,842	\$1,023,500,000	\$303,638,000	\$1,327,138,000
2004	65,461	8,097,880	\$726,000,000	\$281,244,000	\$1,007,244,000
2005	66,753	8,689,389	\$524,900,000	\$294,054,000	\$818,954,000
2006	96,385	9,873,745	\$1,280,419,000	\$424,058,000	\$1,704,477,000
2007	85,705	9,328,045	\$1,149,654,000	\$470,491,000	\$1,620,145,000
2008	78,979	5,292,468	\$1,193,073,000	\$392,783,000	\$1,585,856,000
2009	78,792	5,921,786	\$702,111,000	\$218,418,000	\$920,529,000
2010	71,971	3,422,724	\$578,285,000	\$231,214,000	\$809,499,000
2011	74,126	8,711,367	\$1,055,736,000	\$318,789,000	\$1,374,525,000
2012	67,774	9,326,238	\$1,436,614,000	\$465,832,000	\$1,902,446,000
2013	47,579	4,319,546	\$1,341,735,000	\$399,199,000	\$1,740,934,000
2014	63,212	3,595,613	\$1,195,955,000	\$326,194,000	\$1,522,149,000
2015	68,151	10,125,149	\$1,713,000,000	\$417,543,000	\$2,130,543,000
2016	67,595	5,503,538	\$1,603,806,000	\$371,739,000	\$1,975,545,000
2017	71,499	10,026,086	\$2,410,165,000	\$508,000,000	\$2,918,165,000

NATIONAL INTERAGENCY COORDINATION CENTER WILDLAND FIRE ANNUAL REPORT 2017

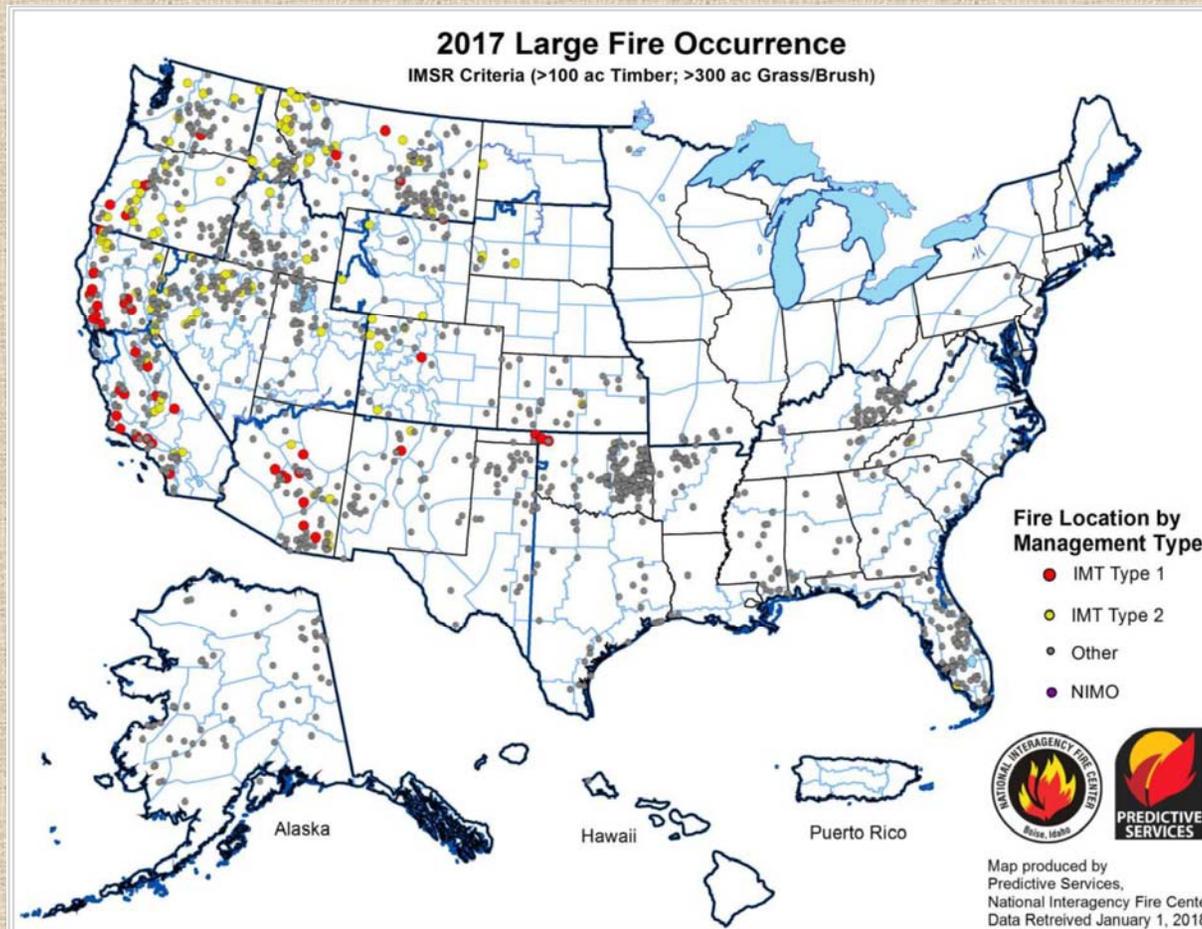
A total of **12,306 structures** were destroyed by wildfires in 2017, including **8,065 residences**, 4,002 minor structures, 229 commercial structures and 10 mixed commercial/residential structures. This is well above the annual average of **1,545 residences**, 1,236 minor structures, and 55 commercial structures destroyed by wildfire with **this year ranking 1st in total structures lost**. California accounted for the highest number of structures lost in one state in 2017: 7,778 residences, 178 commercial structures and 3,056 minor structures.

NATIONAL INTERAGENCY COORDINATION CENTER WILDLAND FIRE ANNUAL REPORT 2017

National Type 1 teams were mobilized 55 times (up from 31 in 2016), and spent 829 days on assignments (up from 392 days in 2016). All 16 national teams had between one and six assignments each. Type 2 Teams were mobilized 137 times (up from 192 in 2016), for a total of 1,873 days assigned to incidents (up from 1,046 days in 2016). National Incident Management Organizations (NIMO) mobilized 8 times in 2017 to both wildland fire and non-fire incidents (up from 7 times in 2016).



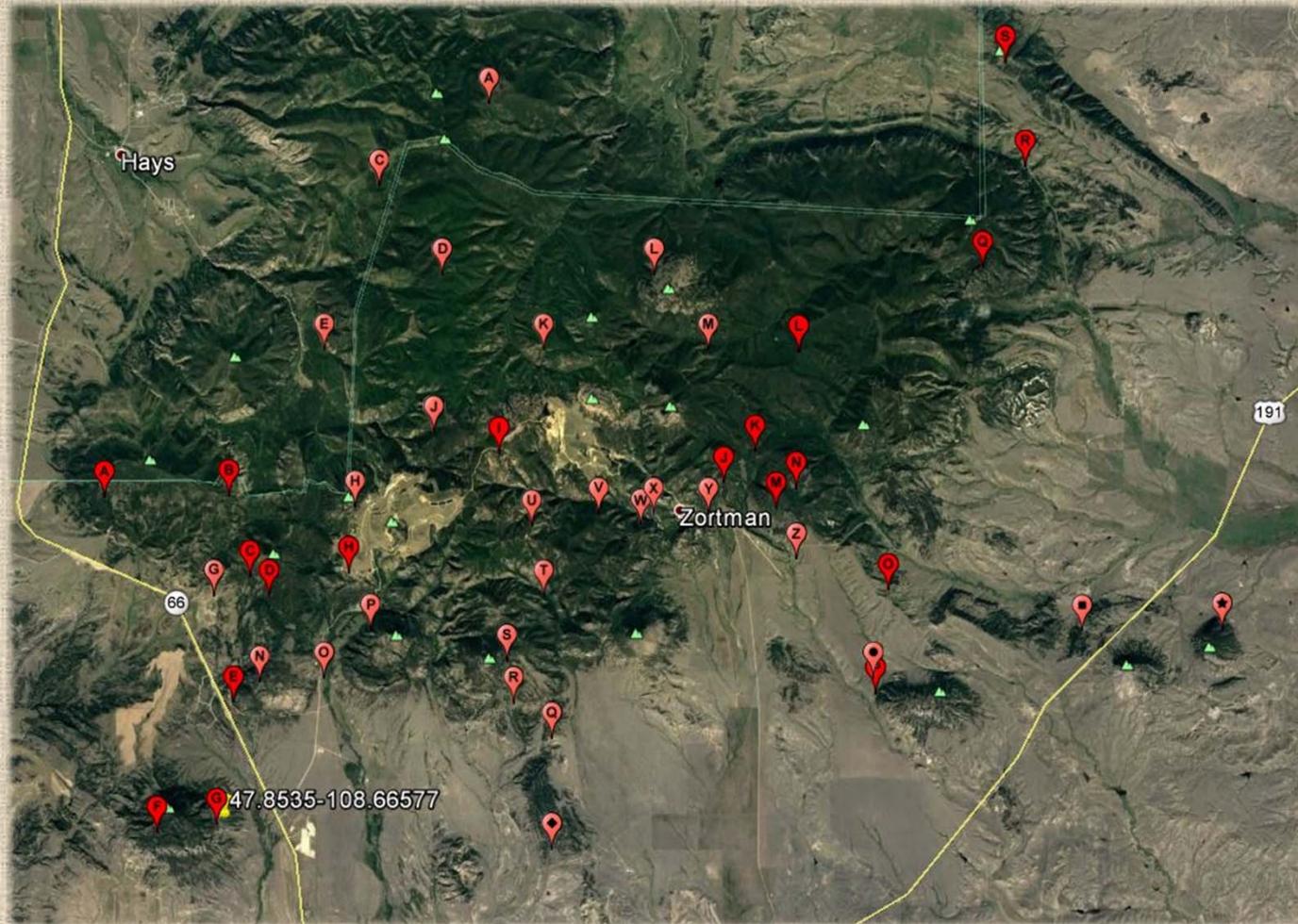
NATIONAL INTERAGENCY COORDINATION CENTER WILDLAND FIRE ANNUAL REPORT 2017



LITTLE ROCKIES FIRES PER THE BLM (4/23/18)

Years Analyzed:
1980-2017

No. of Fires: 51
Total Acres
Burned: 18,493.9
Total Human
Caused Fires: 12



LITTLE ROCKIES FIRES (TIMEFRAME: 1980-2017)

July Fire - 11,697 acres

Monument - 5,775 acres

All Other 49 Fires - less than 200 acres each

Date of Analysis:		4/23/2018												
State	Reporting Unit Id	Calendar Year	Control Acres	Fire Name	# Action Fires	# Assist Fires	Index Time	Cause Category	# Human Caused Fires	Owner	Latitude DD	Longitude DD	MAP SYMBOL	
MT	MTLED	1983	0.2	SHRINE	1		8/7/1983 20:53	Human	1	BLM	47.95	-108.5667	K	
MT	MTLED	1983	0.5	CAMP CREEK	1		8/28/1983 16:27	Natural		BLM	47.95	-108.5167	M	
MT	MTLED	1983	1	LITTLE RKY	1		8/29/1983 6:22	Natural		BLM	47.9167	-108.5333	x	
MT	MTLED	1984	0.2	TRAVIS	1		7/4/1984 16:10	Human	1	BLM	47.8833	-108.4667	•	
MT	MTLED	1984	5	MONUMENTPK	1		8/23/1984 14:14	Natural		BLM	48	-108.5833	A	
MT	MTLED	1985	1	PONY GULCH	1		7/3/1985 23:00	Natural		BLM	47.9167	-108.55	V	
MT	MTLED	1987	3	TIN CUP	1		7/15/1987 20:05	Natural		BLM	47.9333	-108.6	I	
MT	MTLED	1988	1	LANDUSKY	1		10/5/1988 13:55	Human	1	BLM	47.8833	-108.6333	O	
MT	MTLED	1988	5	BEAVER CRK	1		6/11/1988 6:36	Natural		BLM	47.9167	-108.5167	Y	
MT	MTLED	1988	0.4	ROCKCREEK	1		7/4/1988 11:20	Natural		BLM	47.9333	-108.6	J	
MT	MTLED	1988	2	NORTH FORK	1		7/11/1988 22:44	Natural		BLM	47.95	-108.6333	E	
MT	MTLED	1988	5775	Monument	1		7/22/1988 0:00	Human	1	BLM	47.8	-108.663		
MT	MTLED	1989	2	NORTHFORK	1		7/25/1989 14:46	Natural		BLM	47.9833	-108.6167	C	
MT	MTLED	1991	12	SILVERPEAK	1		8/29/1991 13:00	Natural		BLM	47.9	-108.5667	T	
MT	MTLED	1991	200	LANDUSKY	1		10/12/1991 15:15	Natural		BLM	47.9	-108.6667	G	
MT	MTLED	1995	0.3	DRY GULCH	1		8/7/1995 21:30	Natural		BLM	47.8783	-108.5758	R	
MT	MTLED	1996	0.2	SNAKEBERRY	1		7/31/1996 16:30	Human	1	BLM	47.9364	-108.6192	F	
MT	MTLED	1998	0.1	COBURN	1		9/9/1998 9:45	Natural		BLM	47.8931	-108.3608	*	
MT	MTLED	1998	395	RICKER BUT		1	9/16/1998 0:00	Human	1	UNK	47.8928	-108.4033	■	
MT	MTLED	1998	0.3	SAND CREEK		1	9/18/1998 0:00	Natural		UNK	47.9144	-108.5372	U	
MT	MTLED	2000	0.1	Pony	1		8/28/2000 14:44	Natural		BLM	47.9142	-108.5703	U	
MT	MTLED	2001	38	Monument	1		7/28/2001 19:45	Natural		BLM	47.9653	-108.5975	D	
MT	MTMAD	2003	3	Thor	1		5/26/2003 14:00	Natural		BLM	47.8486	-108.5642	◆	
MT	MTMAD	2003	1.5	Mission	1		5/29/2003 11:00	Natural		BLM	47.9181	-108.6239	H	
MT	MTMAD	2003	3	Landusky	1		7/1/2003 19:15	Human	1	Private	47.8825	-108.6528	N	
MT	MTMAD	2003	1.6	Grouse	1		7/16/2003 11:09	Natural		BLM	47.8711	-108.5642	Q	
MT	MTMAD	2003	0.1	Beaver	1		8/6/2003 21:41	Natural		BLM	47.9653	-108.5331	L	
MT	MTMAD	2003	8	Zort Asst		1	8/13/2003 0:35	Natural		Private	47.9075	-108.49	Z	
MT	MTMAD	2003	200	BIA Assist		1	8/14/2003 13:42	Natural		BIA	47.9833	-108.6167	B	
MT	MTMAD	2004	2	Bench	1		4/8/2004 16:50	Natural		BLM	47.8869	-108.5778	S	
MT	MTMAD	2004	0.1	Landusky		1	5/14/2004 11:34	Human	1	Private	47.8931	-108.6192	P	
MT	MTMAD	2004	0.3	Sunflower	1		8/6/2004 12:34	Natural		BLM	47.9203	-108.6622	B	
MT	MTMAD	2005	1	Mission	1		9/9/2005 17:06	Natural		BLM	47.9	-108.65	H	
MT	MTMAD	2005	0.1	Camp Creek	1		4/25/2005 13:00	Human	1	BLM	47.9219	-108.49	N	
MT	MTMAD	2006	100	Big Warm		1	8/10/2006 9:50	Natural		BIA	47.9667	-108.4333	Q	
MT	MTMAD	2006	0.8	Border	1		7/1/2006 14:50	Natural		Private	47.92	-108.7	A	
MT	MTMAD	2007	1.4	Mushroom	1		10/23/2007 8:04	Human	1	Private	47.9047	-108.6258	H	
MT	MTMAD	2007	0.5	Thornhill Butte	1		7/2/2007 12:05	Natural		BLM	47.8519	-108.6839	F	
MT	MTMAD	2009	0.1	Beaver Creek	1		5/24/2009 18:20	Natural		BLM	47.9294	-108.5025	K	
MT	MTMAD	2010	12	Chopwood		1	7/16/2010 13:10	Natural		BIA	47.9872	-108.4203	R	
MT	MTMAD	2011	1.5	Camp Creek	1		7/19/2011 23:38	Natural		BLM	47.9178	-108.4961	M	
MT	MTMAD	2012	0.1	Turtle Mountain	1		8/10/2012 7:06	Natural		Private	47.9039	-108.6558	C	
MT	MTMAD	2013	0.1	Witcum Road	1		8/28/2013 18:45	Natural		BLM	47.923	-108.512	J	
MT	MTMAD	2013	0.1	Antoine	1		8/29/2013 18:20	Natural		BLM	47.929	-108.5802	I	
MT	MTMAD	2013	1.7	Bear Gulch		1	8/31/2013 1:30	Human	1	BIA	47.9012	-108.4621	O	
MT	MTMAD	2014	5.6	BIA Assist Beaver CR		1	4/11/2014 22:00	Human	1	BIA	48.00842	-108.4263	S	
MT	MTMAD	2014	0.1	Square Butte	1		6/14/2014 11:22	Natural		Private	47.8535	-108.6658	G	
MT	MTMAD	2014	0.9	Square Butte 2	1		6/14/2014 11:18	Natural		Private	47.8802	-108.466	P	
MT	MTMAD	2016	2.5	Landusky	1		9/1/2016 6:20	Natural		Private	47.87835	-108.6607	E	
MT	MTMAD	2017	6.5	Beaver	1		4/14/2017 19:32	Natural		BLM	47.9492	-108.4906	L	
MT	MTLED	2017	11697	July Fire	1		7/3/2017 0:00	Human	1	BLM				
TOTALS			18493.9		42	9			12					

1988 Monument Peak Fire

- 5,775 Acres Burned
- Naturally revegetated to Lodgepole Pine
- Walk-through surveys revealed as many as 10,000 seedlings per acre.
- Zortman Mine personnel used two Cat D10 bulldozers to help fight the fire.

Montana Zortman/Landusky



2017 JULY FIRE



2017 JULY FIRE STATISTICS

- July 3rd - Started outside of Zortman around 4:30 pm (one of 1st in MT).
- July 4th - Zortman/Landusky Mine Cat D9 in Zortman to protect town.
- July 5th - Smokejumpers arrive. Fire is now at 1,669 acres.
- July 6th - National Incident Management Organization Type 2 Fire Crew Assigned.
- July 7th - Backfires started when fire reaches 5,000 acres.
Backfires account for 4,000 acres burned.
- July 7th - Fire in the morning has grown to 8,381 acres.
- July 8th - Fire has now grown to 10,400 acres.
- July 14th - Fire is 85% contained at 11,440 acres, 264 personnel assigned to fighting the fire.
- July 15th - Fire is 100% contained and has burned 11,697 acres.

COST OF ITEMS LOST AT THE MINES

JULY FIRE MATERIAL COSTS

Item	Quantity	\$/Unit	Total \$
Landusky Lower Pads LAD			
2" HDPE Butt Adapters	16	\$28.42	\$454.72
2" PVC Gate Valves	16	\$63.56	\$1,016.96
3" SS Gate Valves	4	\$606.92	\$2,427.68
2" Whirljet Nozzle Misters	16	\$195.45	\$3,127.20
3" HDPE Flange Adapters	7	\$16.97	\$118.79
2" SS Ball Valve	1	\$113.10	\$113.10
3" HDPE 160# Pipe	5200	\$2.03	\$10,556.00
2" HDPE 160# Pipe	1300	\$0.67	\$871.00
Landusky Mill and Sullivan			
About 40 feet of electric wire going into Mill Gulch	Used existing material		
Roll of wire going into Sullivan	1	\$4,382.53	\$4,382.53
Electric fuses	6	\$55.04	\$330.24
Lost liner in Sullivan	41.13' x 100'	\$0.58	\$2,385.54
Lost liner in Mill Gulch	25.44' x 185	\$0.58	\$2,729.71
ADS Culverts on Steel Bio pipes	Not to be replaced		
Zortman			
Helicopter damaged liner on Zortman 82 Pond			
40 x 55 Repair Liner	2200	\$1.25	\$2,750.00
Seam Tape	0.5'x100'/roll	\$384/roll	\$768.00
Primer	Gallon	\$70/gal	\$140.00
Roller			\$28.00
Freight			\$281.00
Total July Fire Materials			\$36,980.47

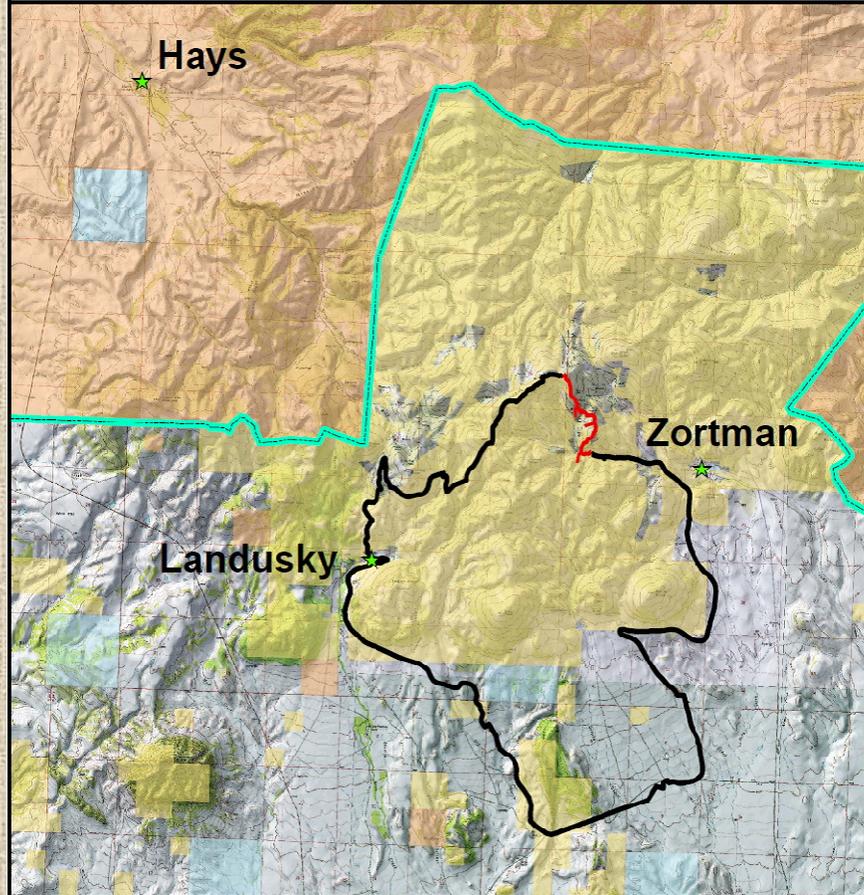
FIRE EXTENT 1 DAY AFTER FIRE STARTED





July Fire

Approximately 11, 699
acres as of 7/15/2017 @



- Bureau of Indian Affairs
- Bureau of Land Management
- Local Government
- State Lands
- Private Lands
- Fort Belknap Boundary
- ★ Towns
- Uncontrolled Fire Edge
- Completed Line

0 0.5 1 2 Miles

No warranty is made by the Bureau of Land Management for the use of the data for purposes not intended by the BLM. Map does not meet National Map Standards.



Coordinate System: NAD 1983 Albers
Projection: Albers
Datum: North American 1983
False Easting: 0.0000
False Northing: 0.0000
Central Meridian: -106.0000
Standard Parallel 1: -61.5000
Standard Parallel 2: -68.0000
Latitude of Origin: -45.0000
Units: Meter

Map made Date: 7/15/2017 Time: 8:28:49 AM

JULY WILDFIRE

OPHEIM

2

HAVRE

FORT BELKNAP

2

MALTA

GLASGOW

HAYS

191

66

Little Rocky Mountains

- 600+ acres
- Voluntary Evacuations
- Burning in Timber
- Glasgow fireworks ban

WINIFRED

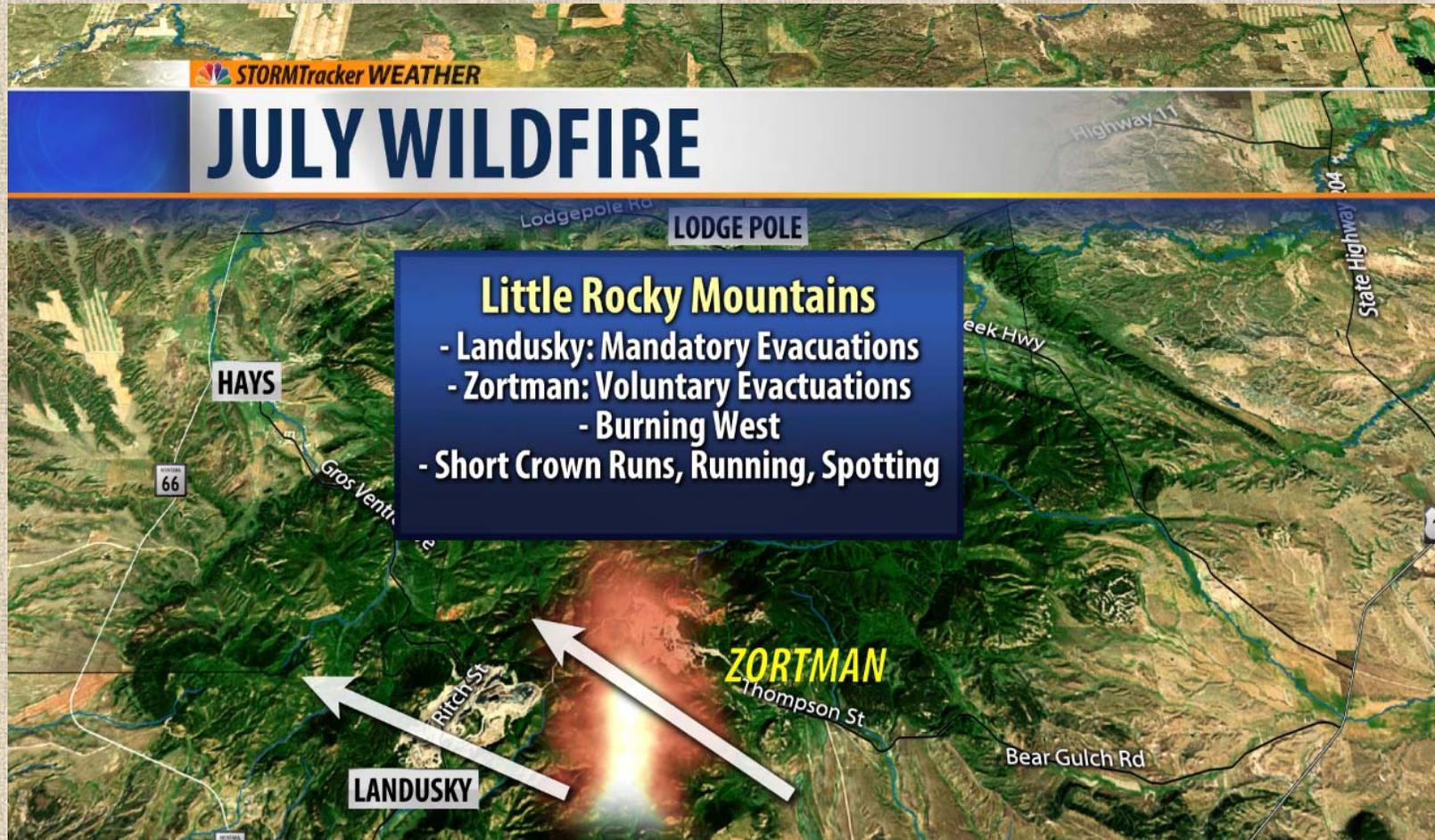
ROY

191

JORDAN

432

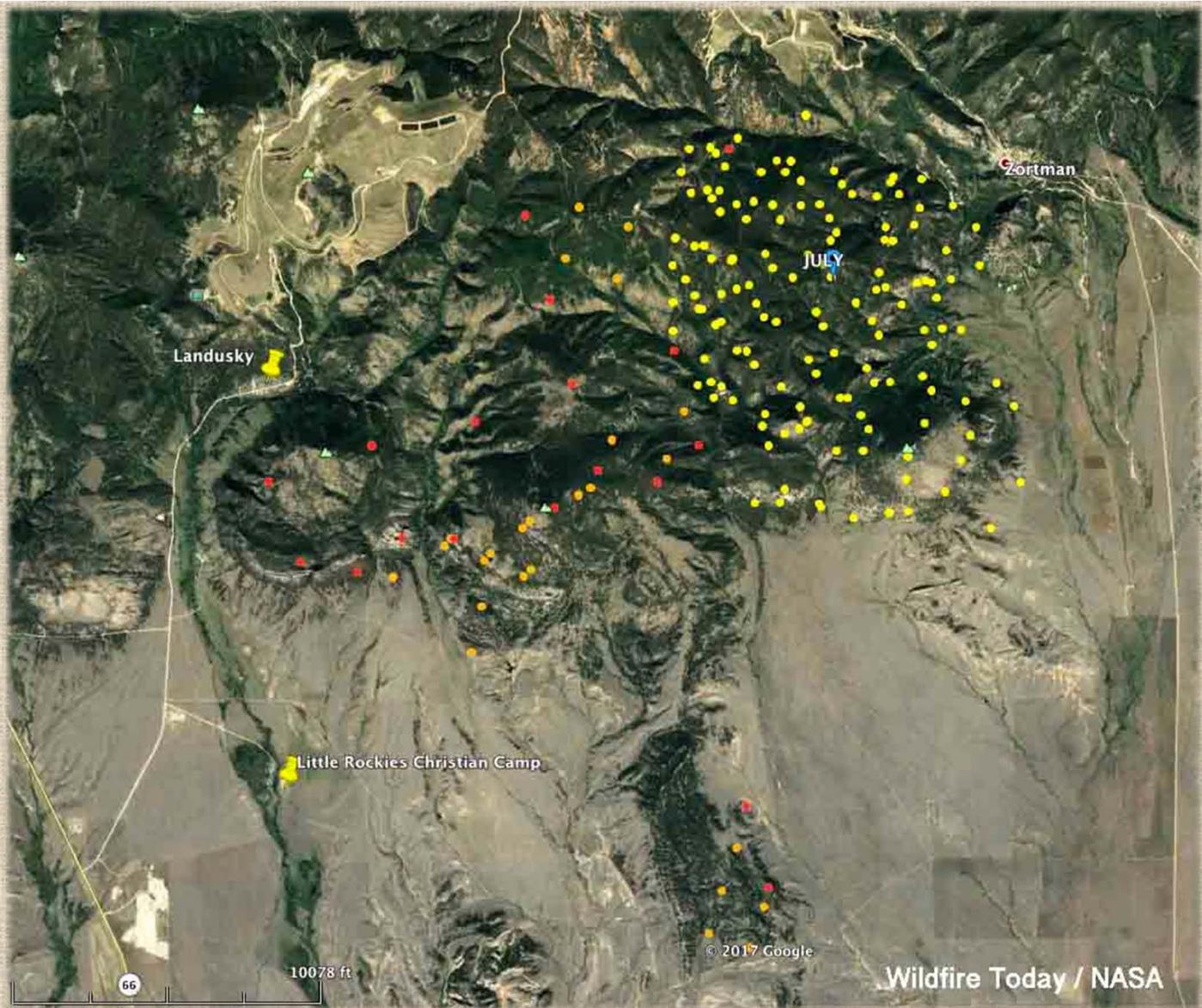
NEWSPAPER NEWS



NEWSPAPER NEWS



FIRE HOT SPOTS



READY, SET, FIRE FIGHT



JULY FIRE VIEWS OF CREWS IN ACTION



VIEW JUST SOUTH OF LANDUSKY



LITTLE ROCKIES ON FIRE AS VIEWED SOUTH FROM THE MINE



VIEW FROM ZORTMAN
MINE LOOKING SOUTH



LANDUSKY MINE ON BOTTOM LEFT



LOOKING TOWARD THE LANDUSKY MINE FROM NEAR THE HIGHWAY



PHOTO CREDIT: BUREAU OF LAND MANAGEMENT

LANDUSKY BIO PLANT AND LEACH PAD SLOPES





LANDUSKY L87 AND
L91 LEACH PADS



LANDUSKY L91 PAD

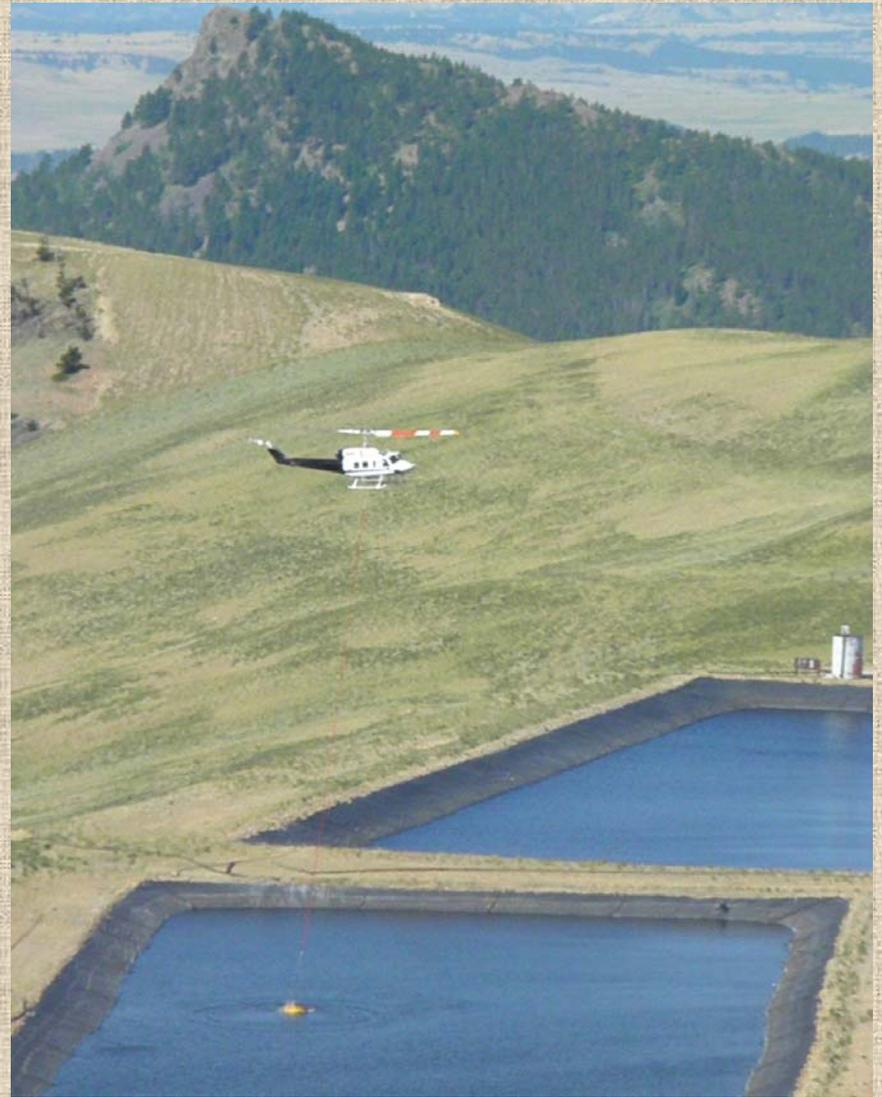
LANDUSKY – NINE MONTHS LATER



LANDUSKY MINE LOWER LEACH PADS



HELICOPTER
DIPPING WATER
FROM THE LANDUSKY
10 MILLION GALLON
BIO PONDS.



ZORTMAN 82 POND LINER DAMAGED BY HELICOPTER



ZORTMAN ALDER GULCH WASTE ROCK DUMP INTENTIONALLY BACKBURNED





LESSONS LEARNED

1. Site Management Plan needs to have site exits clearly identified and everyone working on the site needs to know how to access them.
2. Interact with the local, state, and federal management agencies ahead of time.
3. Establish lines of communications quickly if a higher chain-of-command comes in (such as Type 2 Fire Crew). Go to the top.
4. Don't passively assume that you can't speak up and fight for what you believe.

THANK YOU VERY MUCH

**ARE THERE ANY
BURNING QUESTIONS?**

