

Oil Flow Rate Analysis

Deepwater Horizons Accident

Steve Wereley

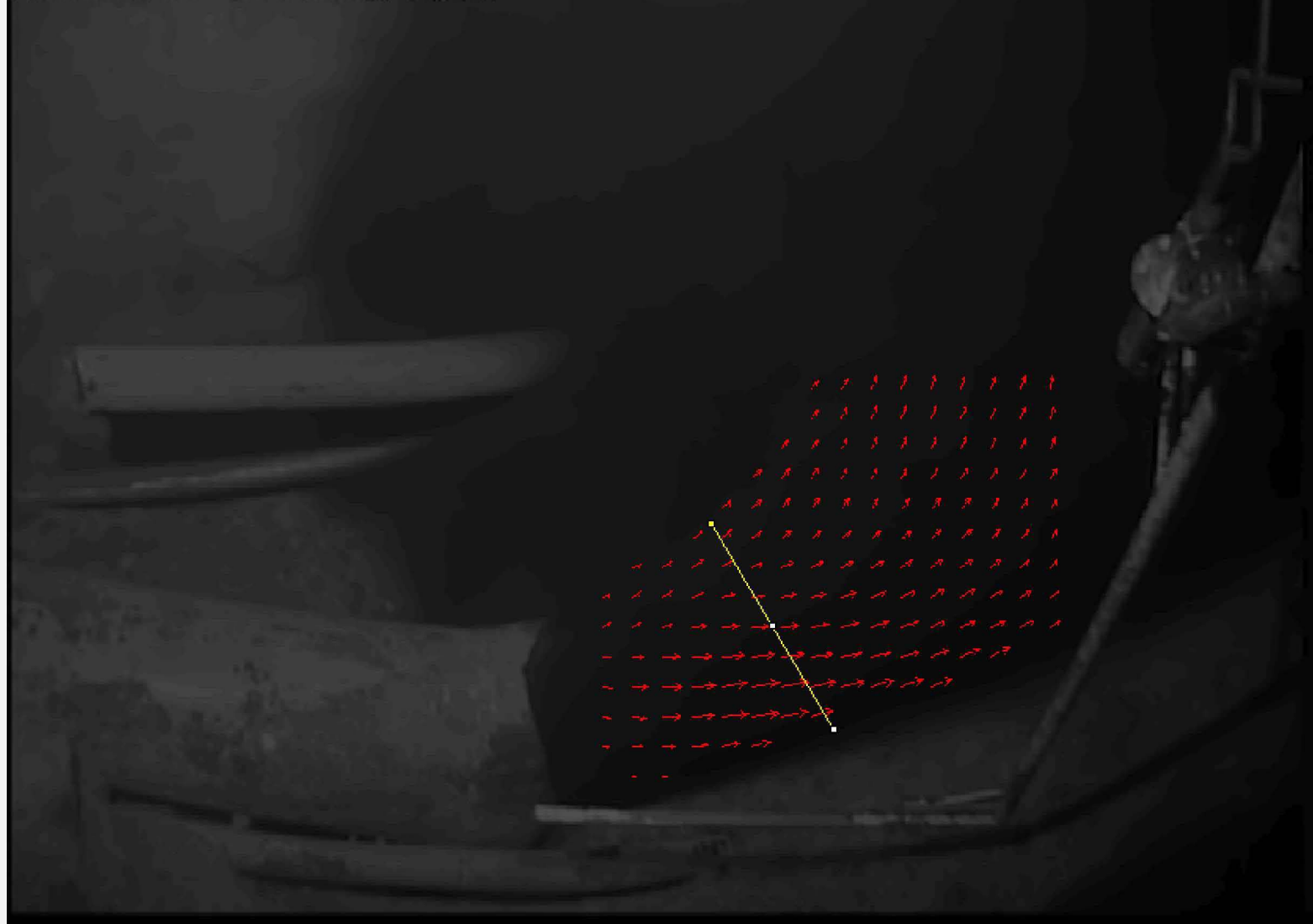
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20100514221717125@H14_Ch1-H264h.mov

- Analysis based on ensemble of 1000 images
 - Begins at time index 17:30:05
 - Ends at time index 17:30:48
 - Clear observation of plume at that point
 - Mostly liquid flow
- Plume outer surface velocity 7.52 in/sec
- Plume diameter at measurement loc
 - 24.53 in
 - Accounts for 30% area reduction
 - Ignored drill pipe presence

Velocity field

MSV SKANDI NEPTUNE SUBSEA 7
E: N: 14/05/2010 17:30:28
Depth: 4957.9 Alt: 4.7 Hdq: 79.9
H14: Plume Testing Ops.



Riser flow calculations

jet disp	2.155	2.155	2.155	pix
jet ratio	1.50	1.75	2.00	
jet vel	7.52	7.52	7.52	in/sec
jet flow	5332	6221	7110	in ³ /sec
GOR	0.29	0.40	0.50	
	13771	22161	31658	bbl/day

H14 BOP Plume May 15 1920-1945

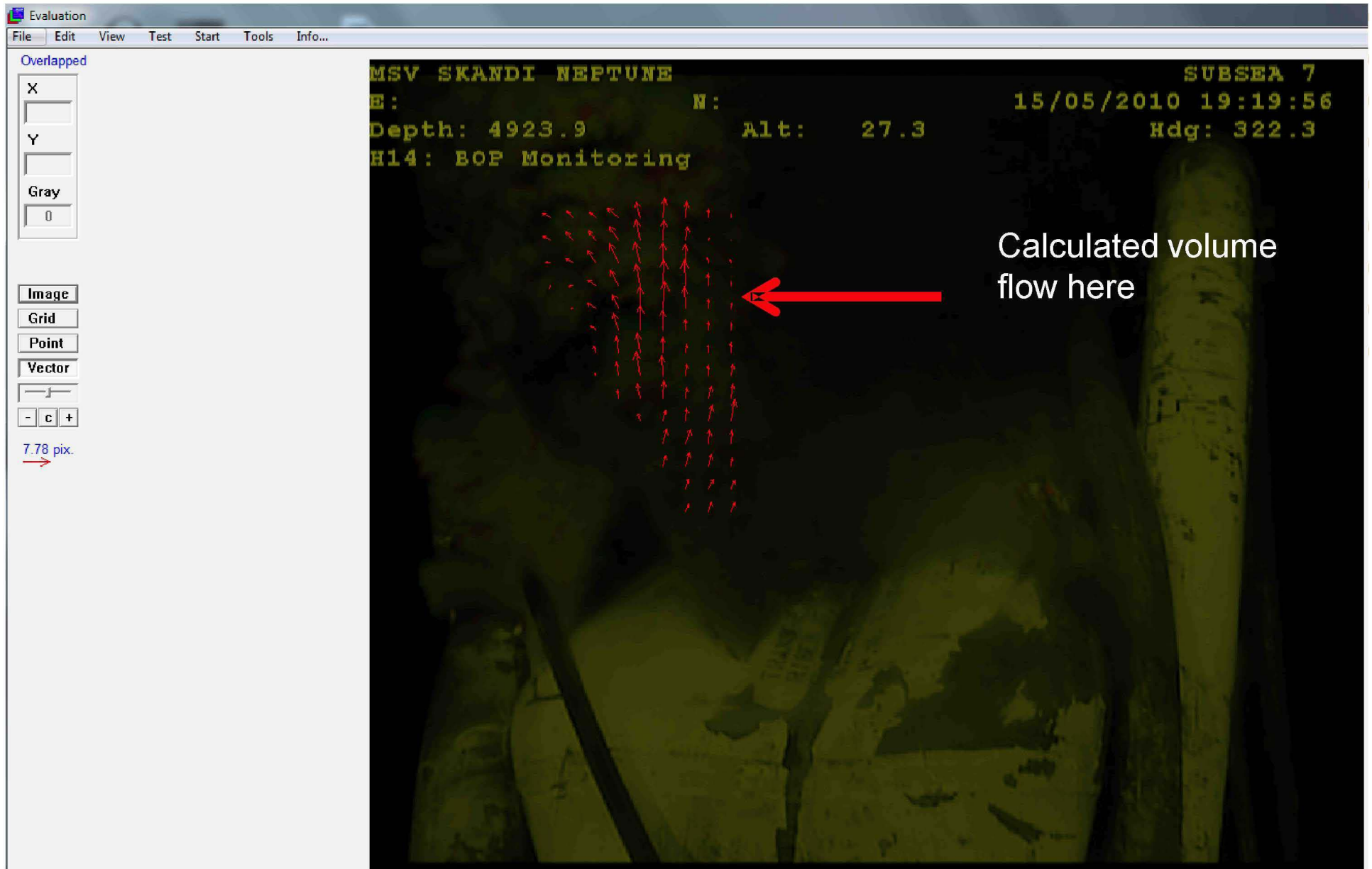
- Used ensemble of 25 images
- Only measured flow from one source
 - Left source too difficult to measure
 - Seems of comparable flow
- Average velocity: 6.95 in/s
- Diameter at that location: 7.61 in

jet vel	6.95	6.95	6.95	in/sec
jet dia	7.61	7.61	7.61	in/sec
jet ratio	1.5	1.75	2	
num jets	2	2	2	
jet flow	474	553	632	in ³ /sec
GOR	0.29	0.4	0.5	
	1225	1971	2815	bbl/day

Overlapped image to show jet boundaries



Vector field



Totals

- Riser: 13771 22161 31658 bbl/day
- Kink Jets: 1225 1971 2815 bbl/day
- Total:
 - Lower bound: 14996 bbl/day
 - Best estimate: 24131 bbl/day
 - Upper bound: 34473 bbl/day