Capital Quarries Company, Inc
Value Mapping Project

Larry Mirabelli & Bill Hissem

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Improving Processes. Instilling Expertise.

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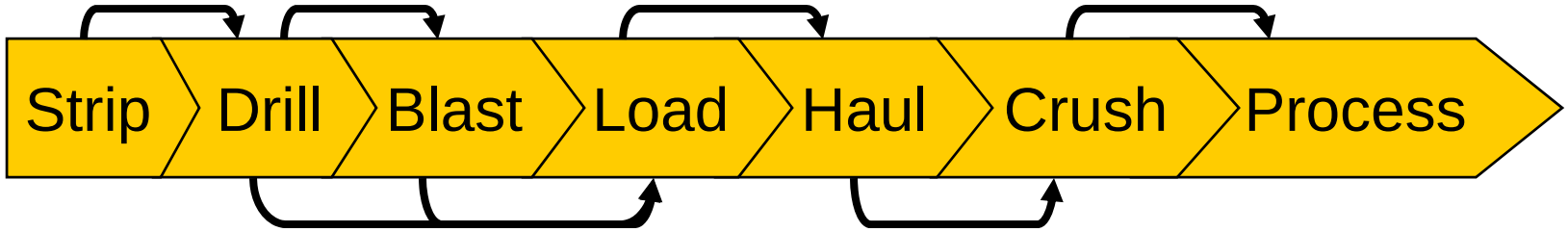
Overview

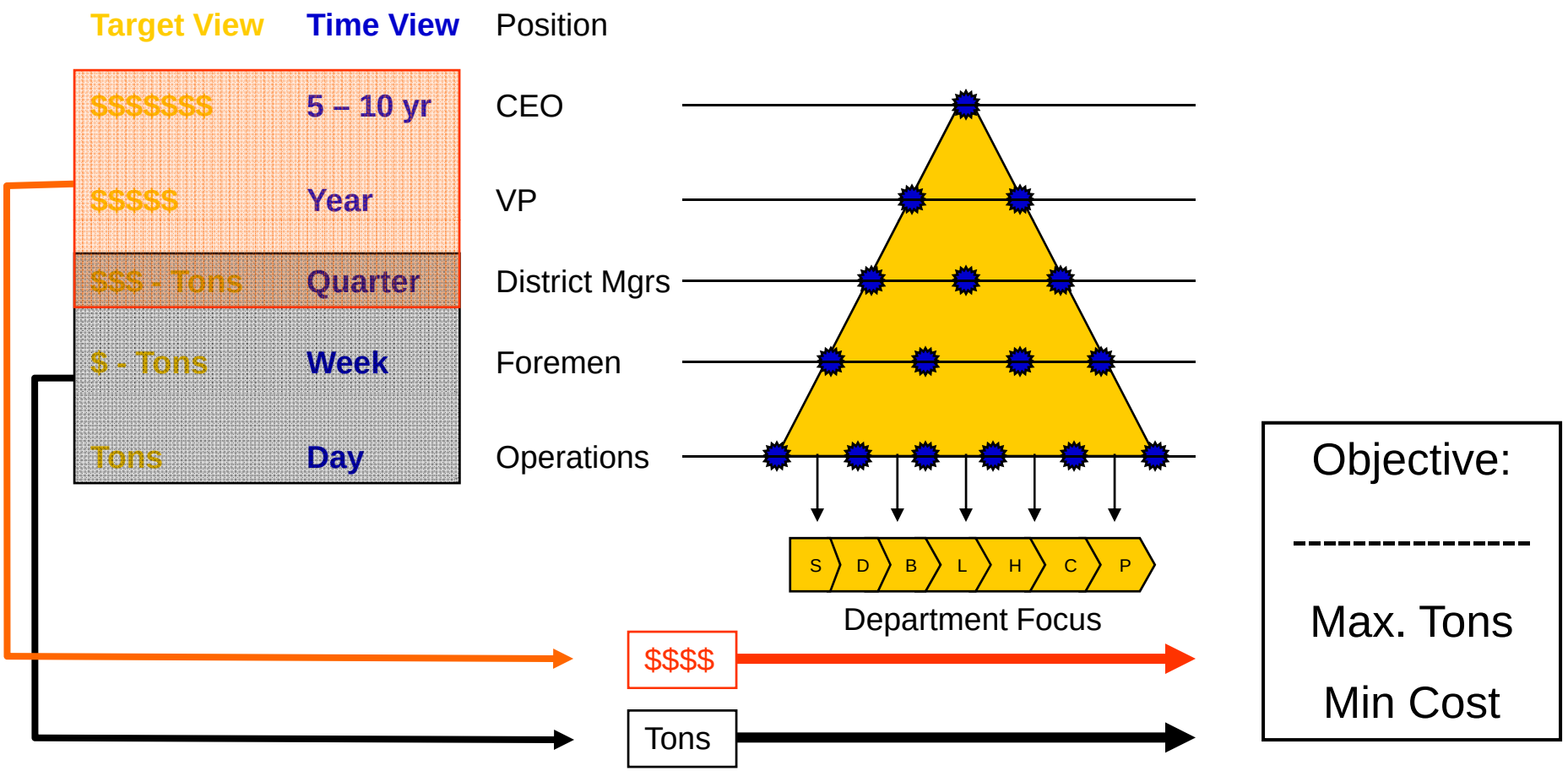
Business/Operations from a different perspective:

BPI: value/process mapping for baseline reference point

Full process stream evaluation to look for and develop system efficiency to improve net economy of production.



Traditional Industrial Management Vs. BPI Management Method



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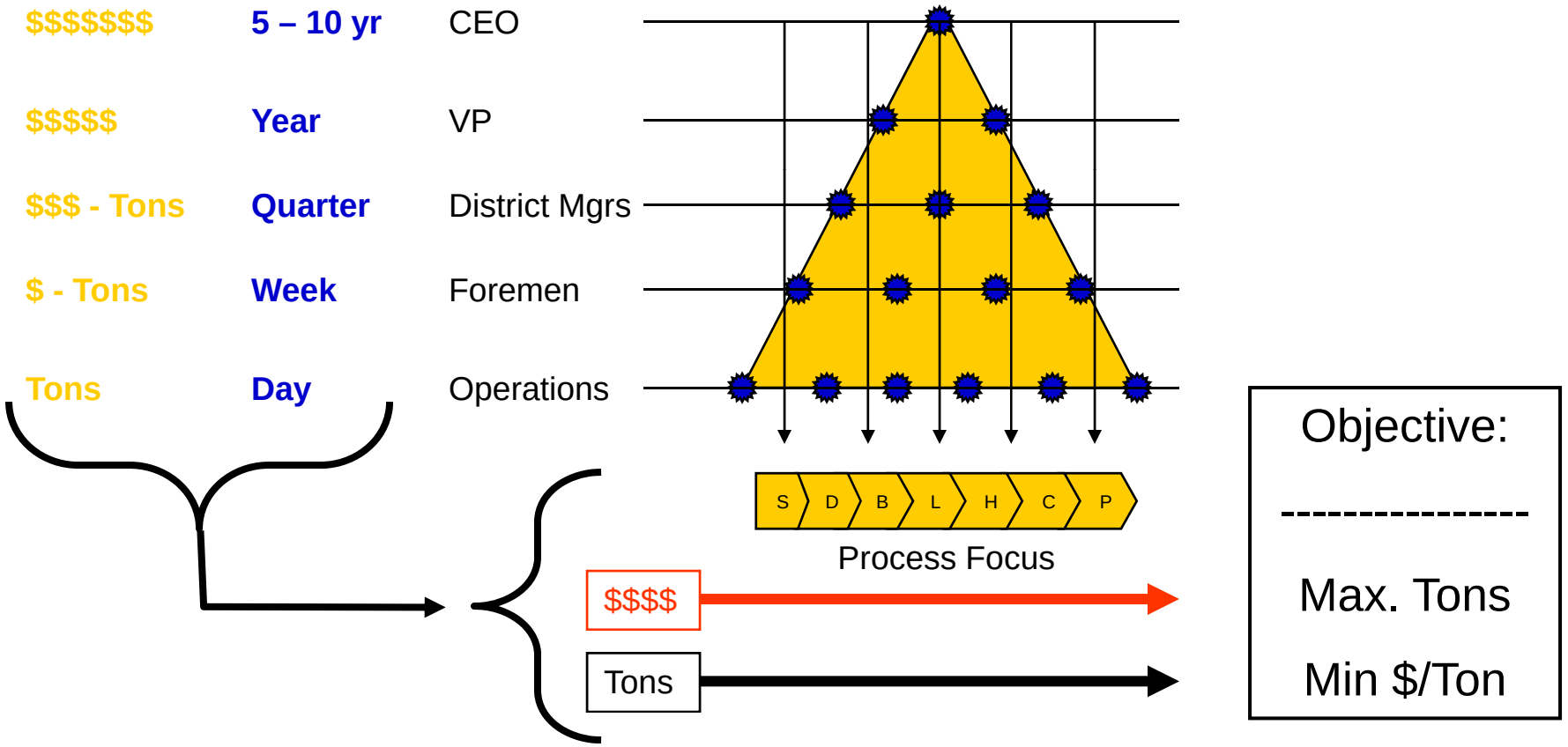
Traditional Industrial Management Vs. BPI Management Method

Target View	Time View	Position
$$$$$$$	5 – 10 yr	CEO
$$$$$	Year	VP
$$$ - Tons	Quarter	District Mgrs
$ - Tons	Week	Foremen
Tons	Day	Operations



Objective:

Max. Tons

Min $/Ton

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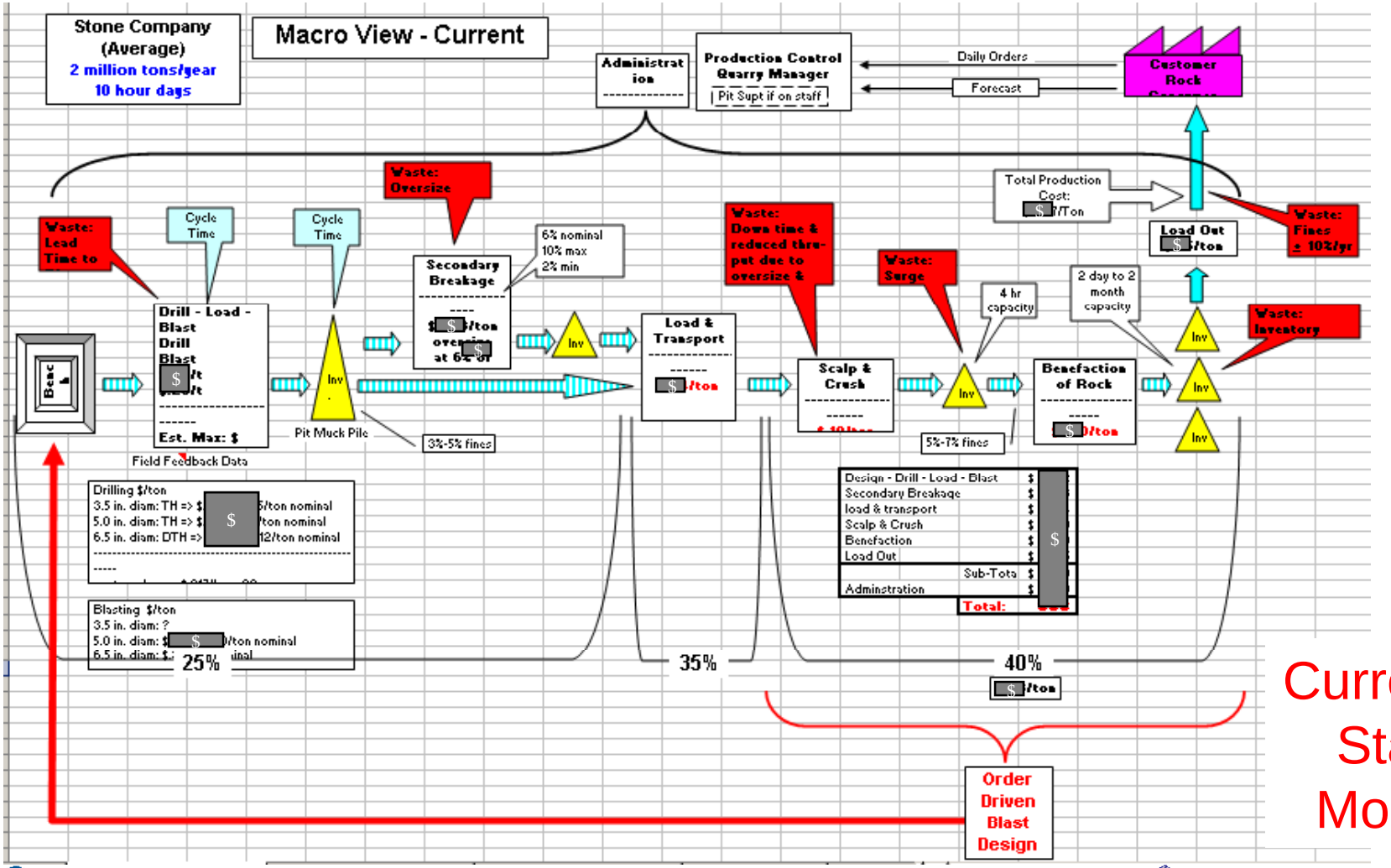
Traditional Linear Process Model



Current State Model

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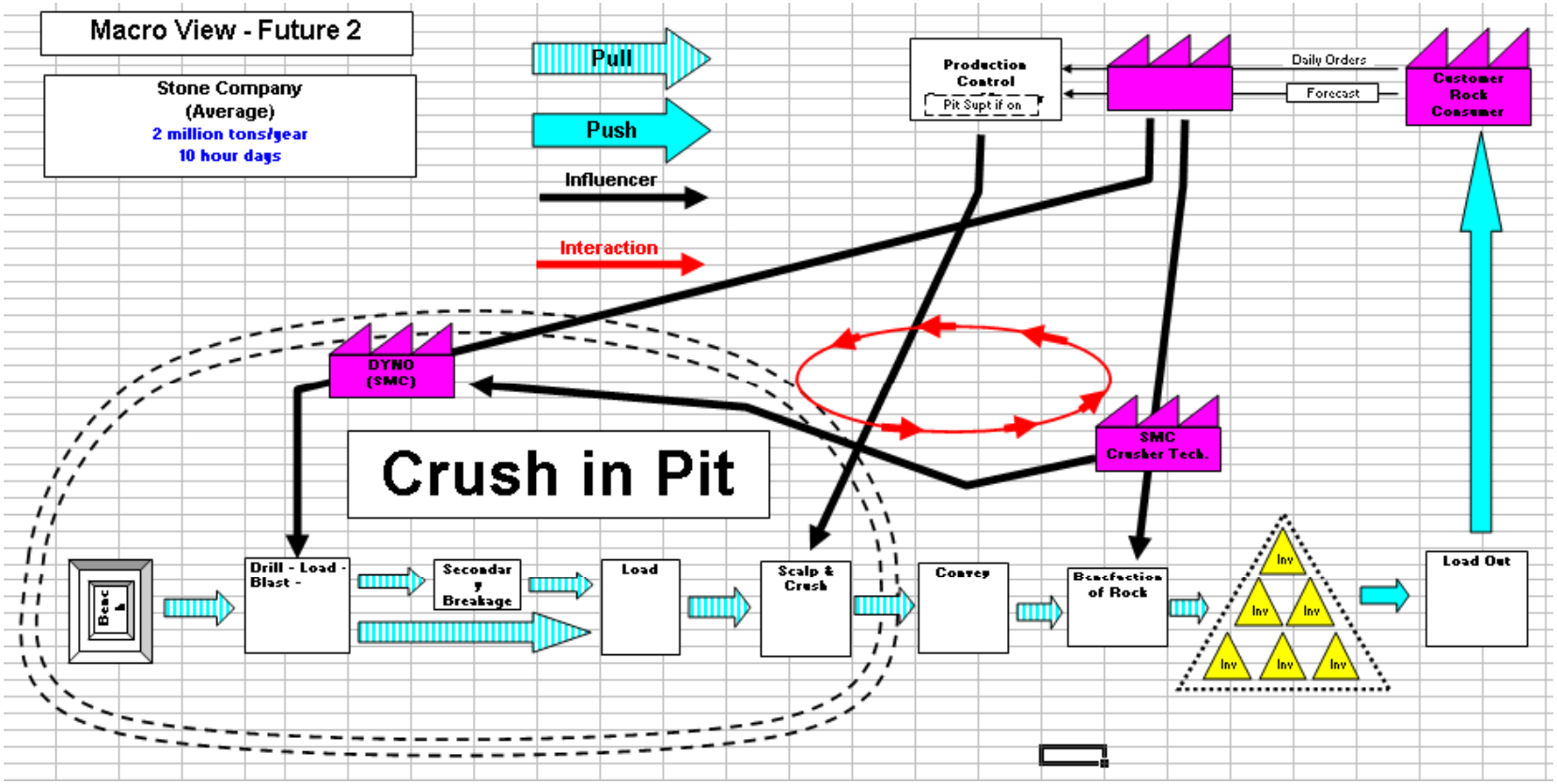
Optimized Process Model

Future State Model



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A Capital Quarries Experience

- Committed to “Lean” Process practice.
- Lean Management Structure with low ego content.
- Excellent employee work ethic.
- Excellent cooperation throughout the organization.
- Positive attitudes and response to program initiative at all levels.

Eric Strope, President Capital Quarries Company, Inc. to speak to us now.

Video 1

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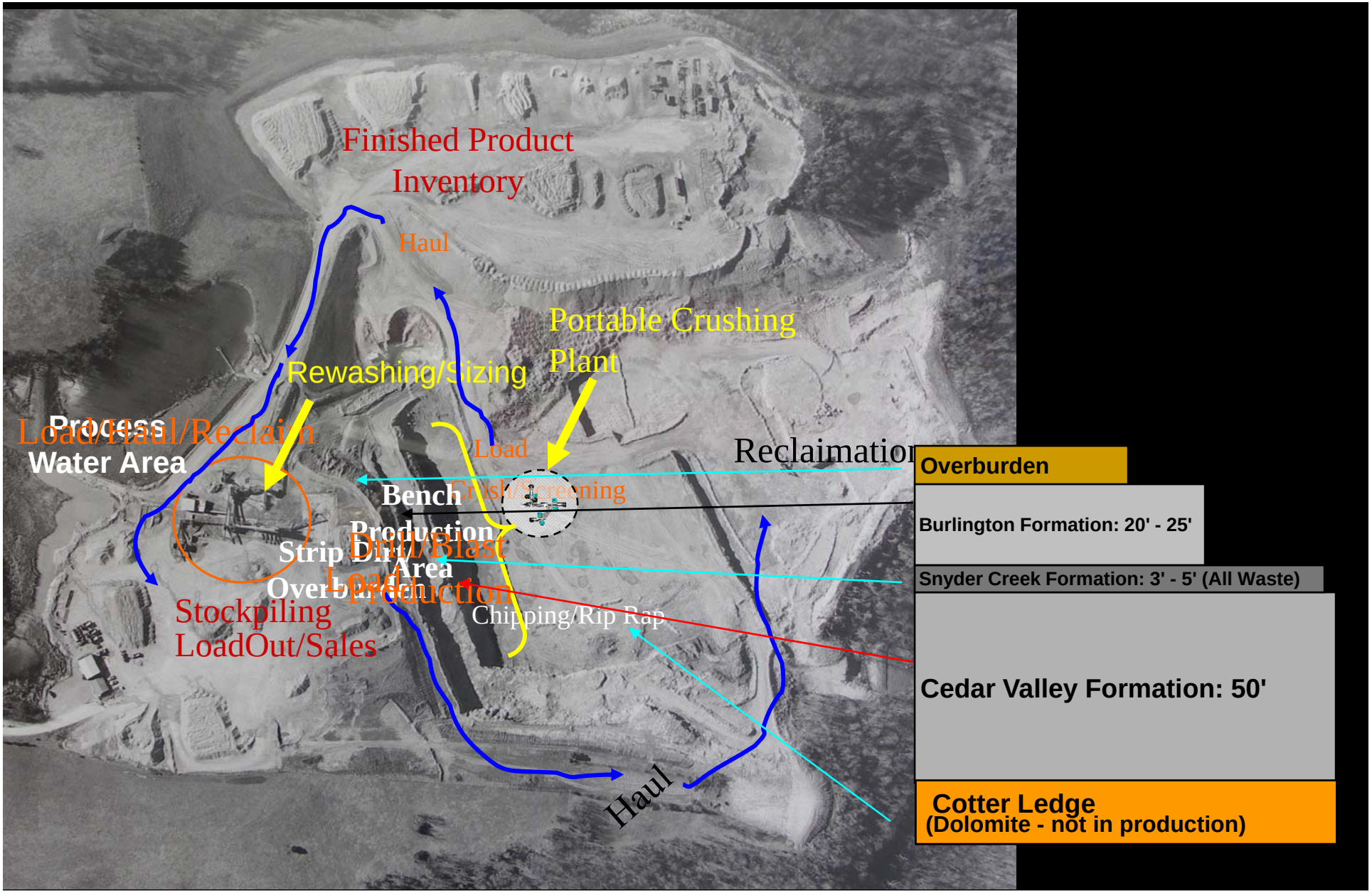
What did we do?

- **Phase 1 – Baseline of Current State**
  - ✓ **Preliminary Site Assessment**
  - ✓ **"Establish Process, Capability and Controls"**
  - ✓ **Establish Finished Product Requirements/Desires**
  - ✓ **Determine project metric requirements**
  - ✓ **Gap Analysis – Identify Metric Needs**
  - ✓ **Install Metrics**
  - ✓ **Cost Determination and Financial Audit**
  - ✓ **New Direct Cost System Implementation**
  - ✓ **Measure Current Operational Performance**
  - ✓ **Develop Current Value Stream Map**
  - ✓ **Model SubTasks**
  - ✓ **Explore Improvement Opportunities Scenarios**

What did we do?

- **Phase 2 Performance Improvement Testing**
  - ✓ **5 Blasts (including one additional baseline)**
  - ✓ **Drill and Blast Measurement Tasks**
  - ✓ **Fragmentation analysis**
  - ✓ **Loading equipment cycle time and performance measurement**
  - ✓ **Plant Performance**
    - Jaw Performance Study
  - ✓ **Cost Tracking**



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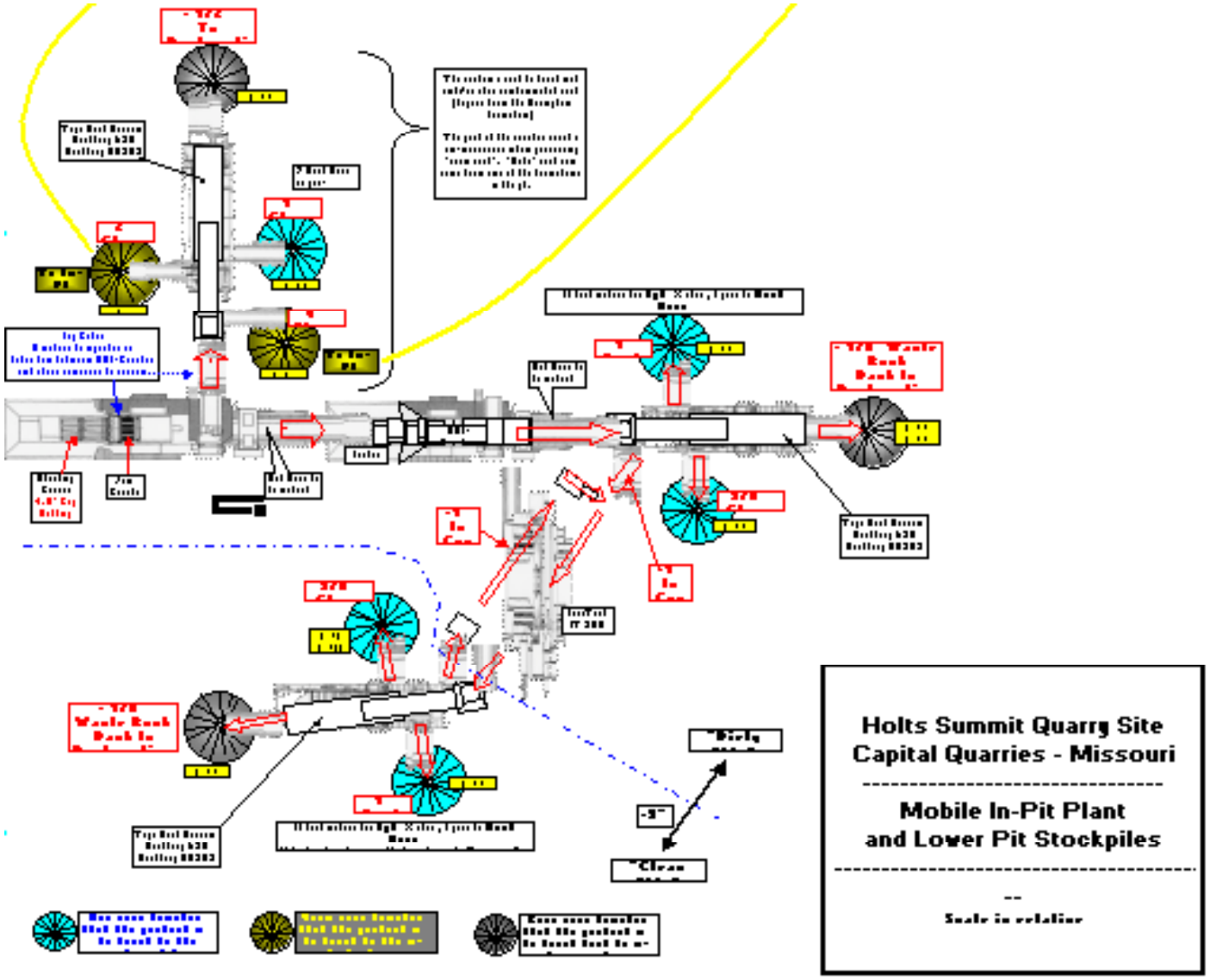
Eric Strope, President Capital Quarries Company, Inc. from Holts Summit Quarry – site of project.

Video 2

“Blast to – 1 inch Product” *

* From Drill to Pre-wash Product.



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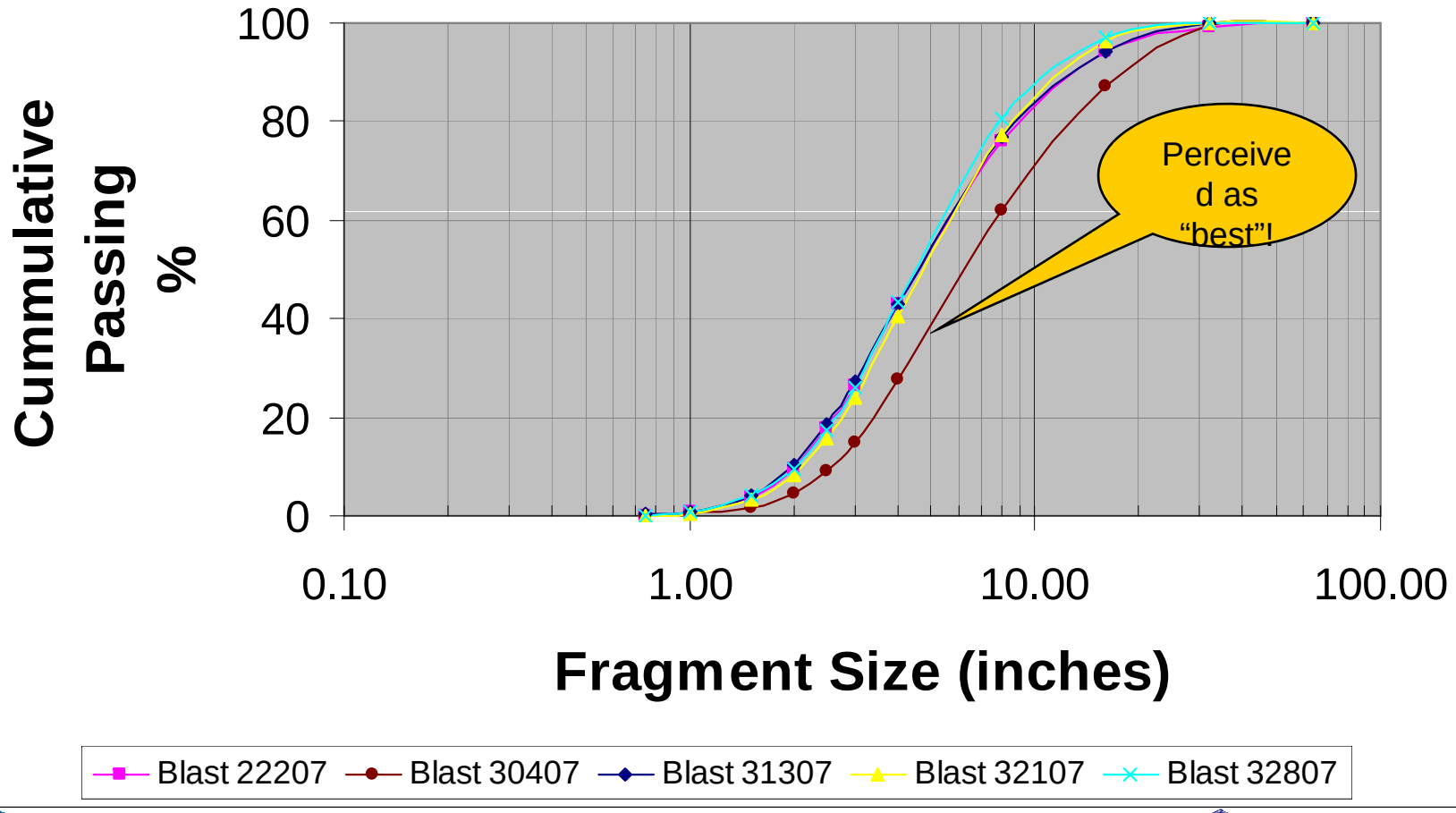
Merged Analysis of All Cuts
Baseline & Validation Blasts



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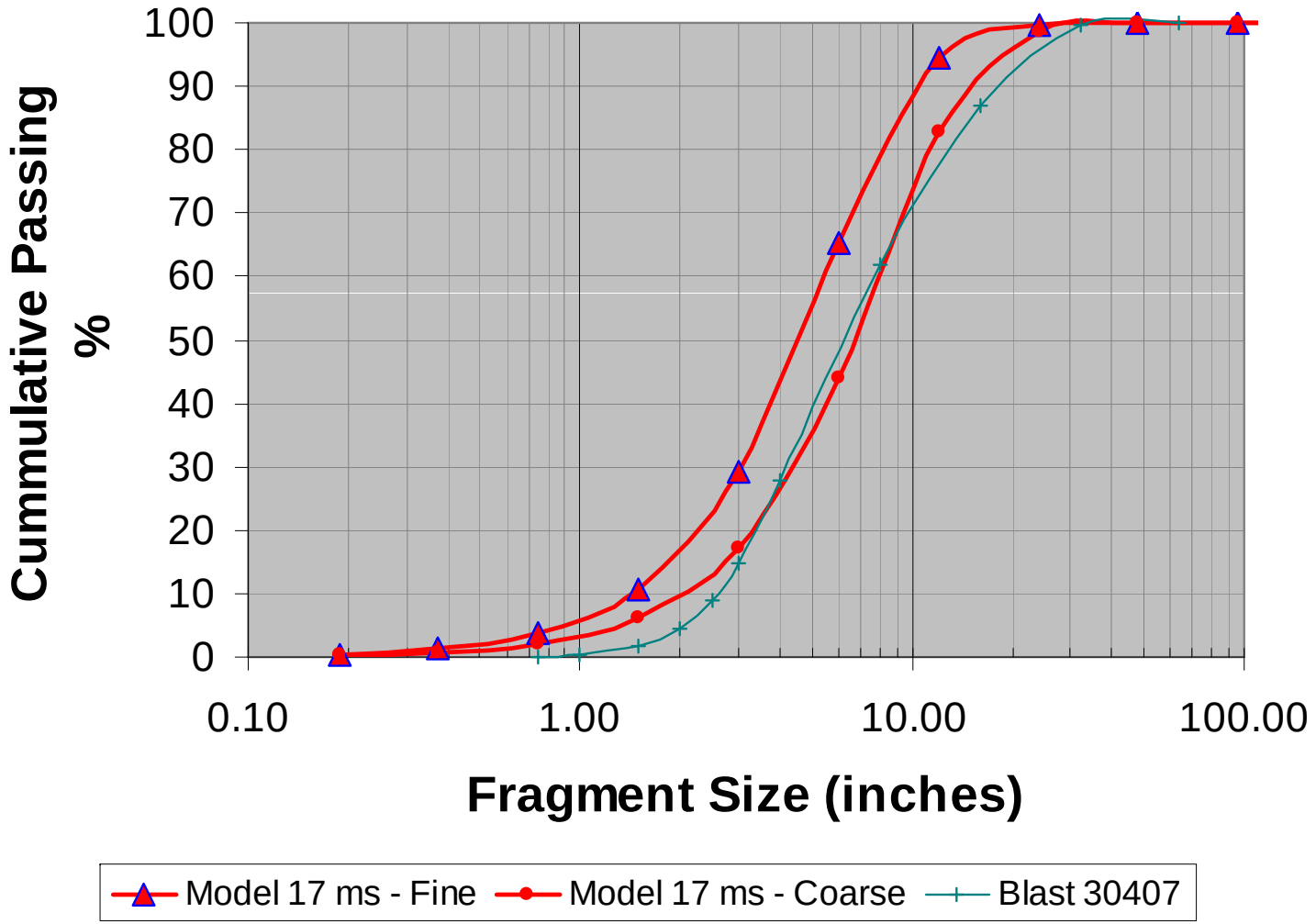
Analysis of
Blast 30407 & Fragmentation Model



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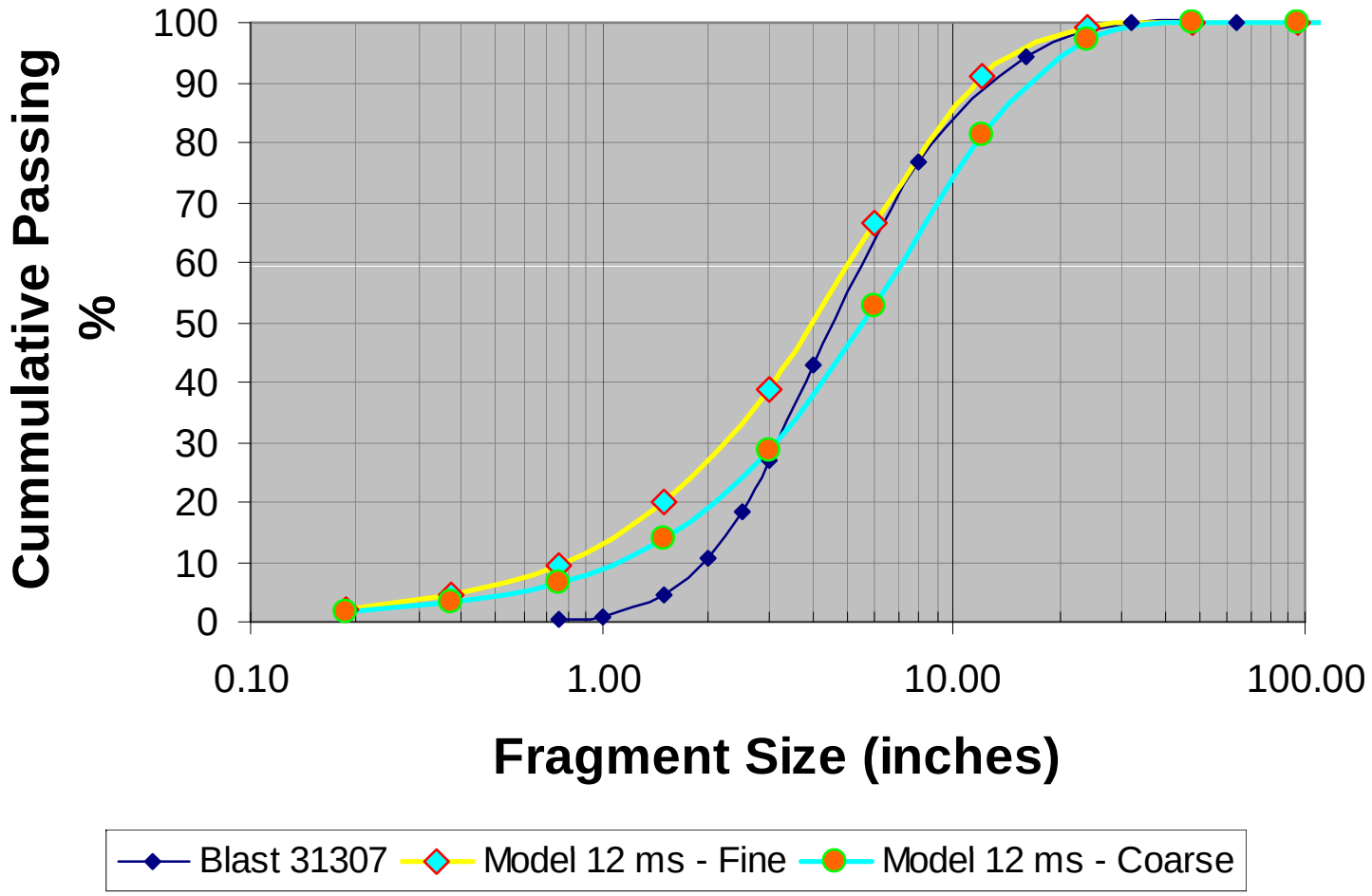
Analysis of
Blast 31307 & Fragmentation Model



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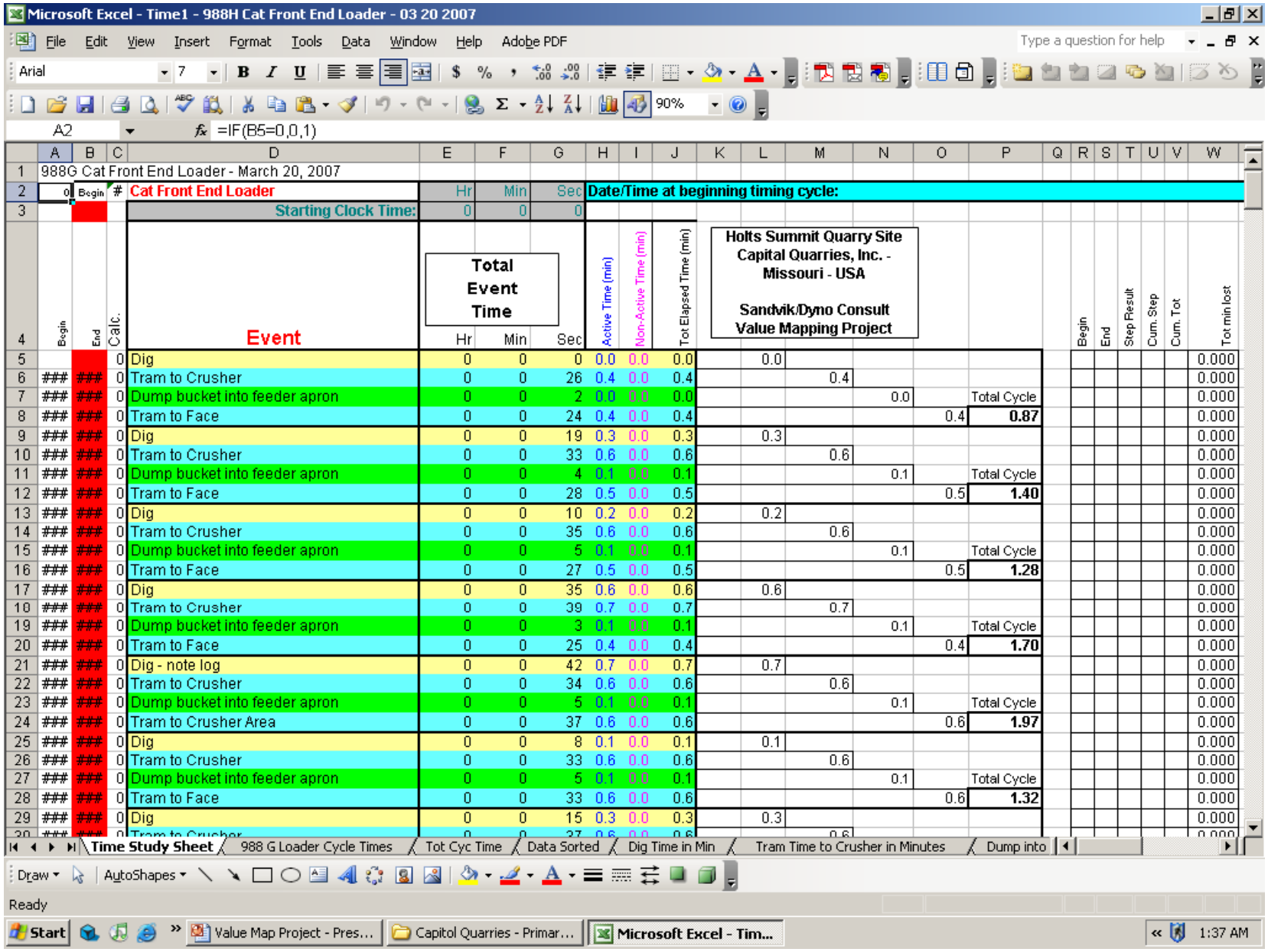

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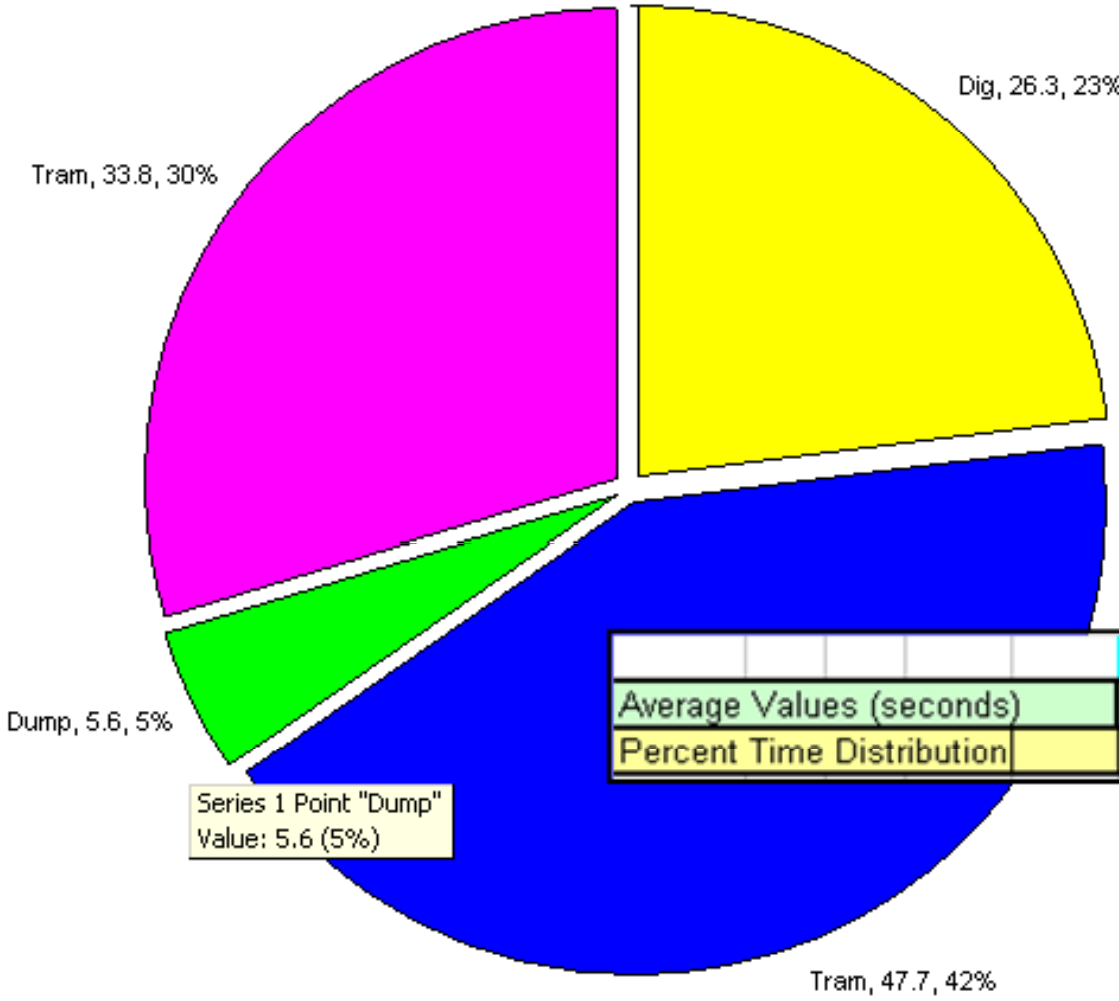
988 G Loader - Segment Cycle Times - Shot rock to Crusher
(Activity /// Time in Seconds /// % of Cycle)
March 20, 2007 - Holt's Summit Quarry



Total Average Cycle Time

	Dig	Tram	Dump	Tram	Total
Average Values (seconds)	26.3	47.7	5.6	33.8	113.4
Percent Time Distribution	23%	42%	5%	30%	100%

Digging at the back of Valadation Blast #2

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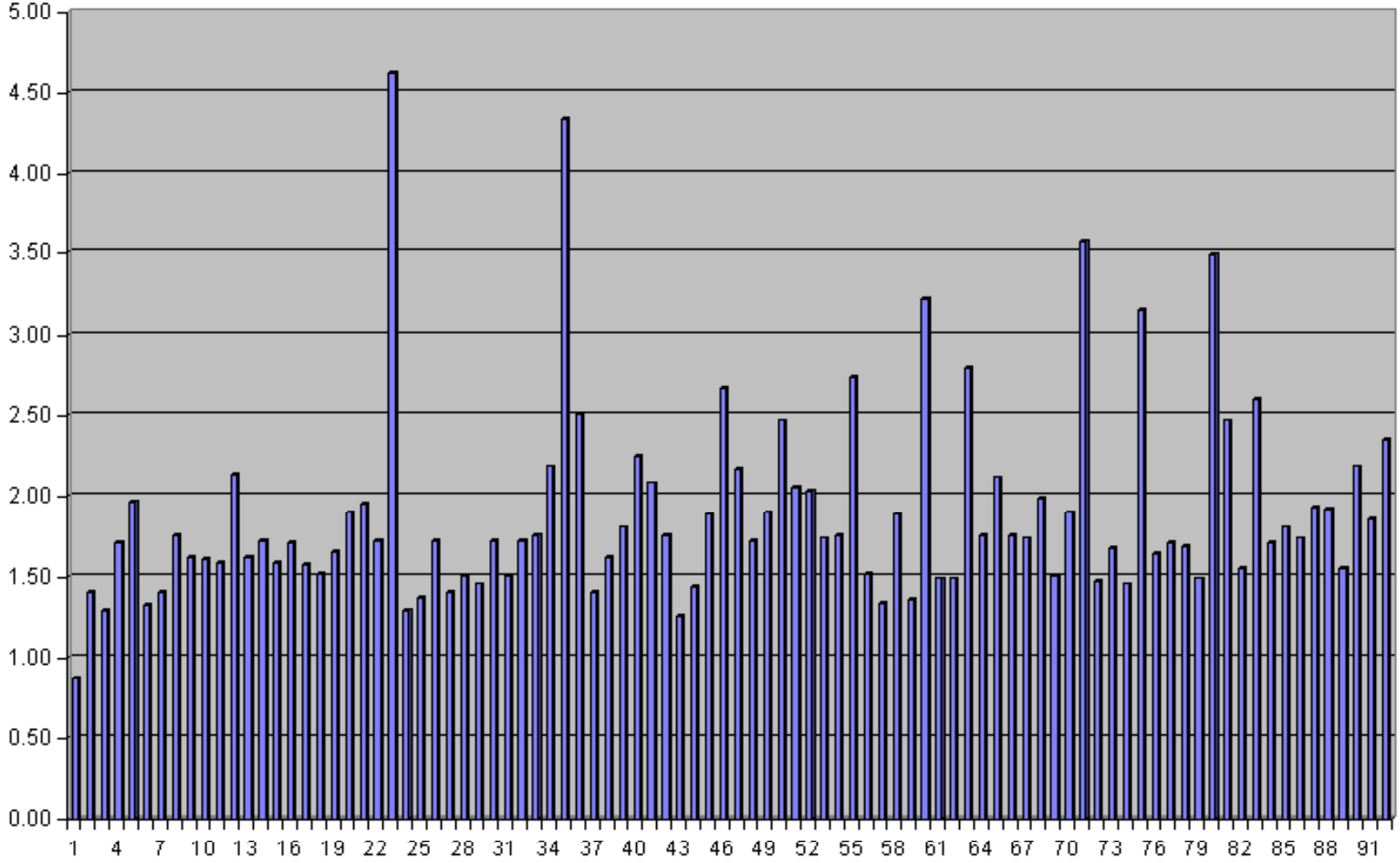
Total Cycle Time - Min.



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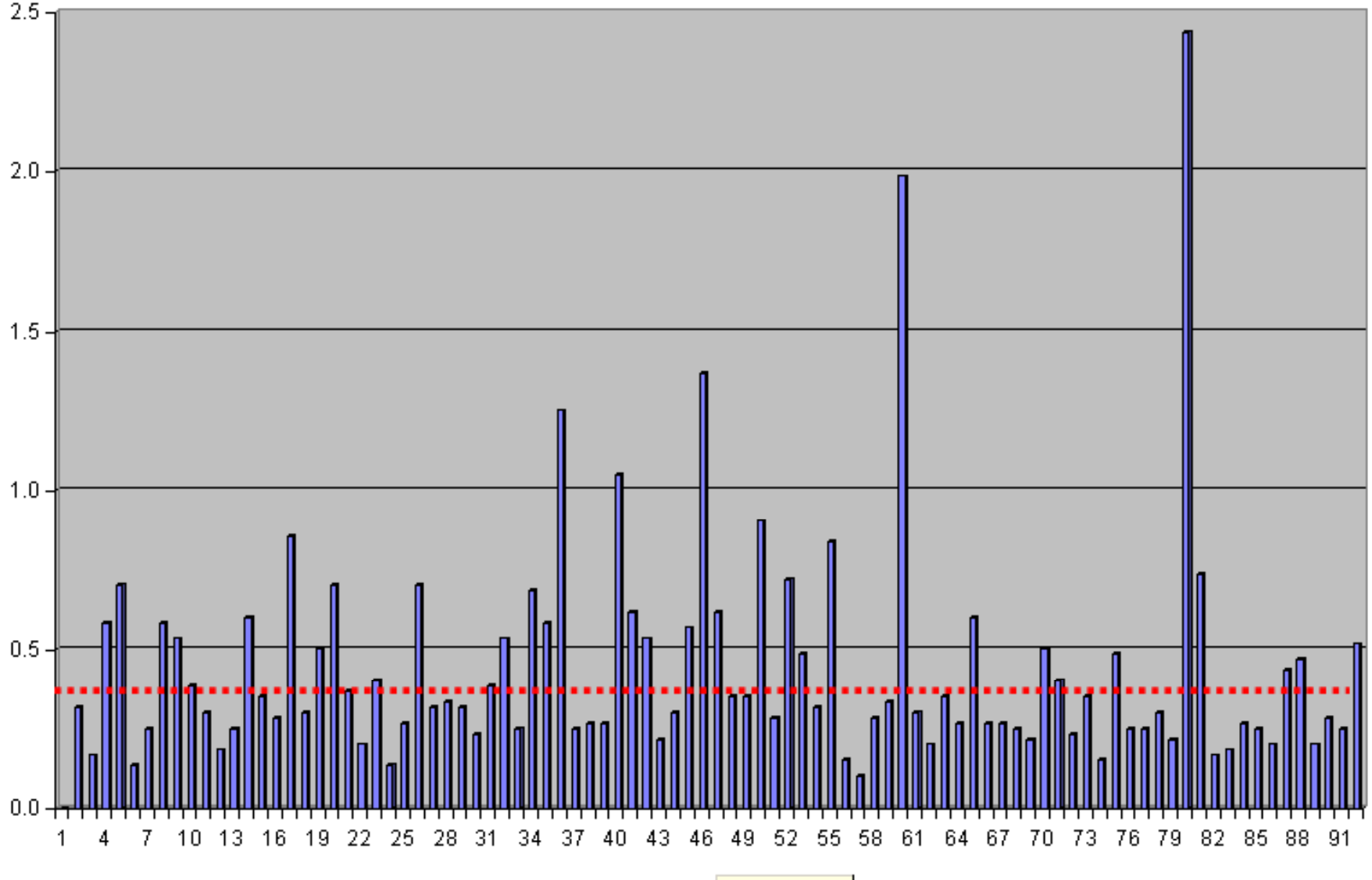
Digging Time in Minutes



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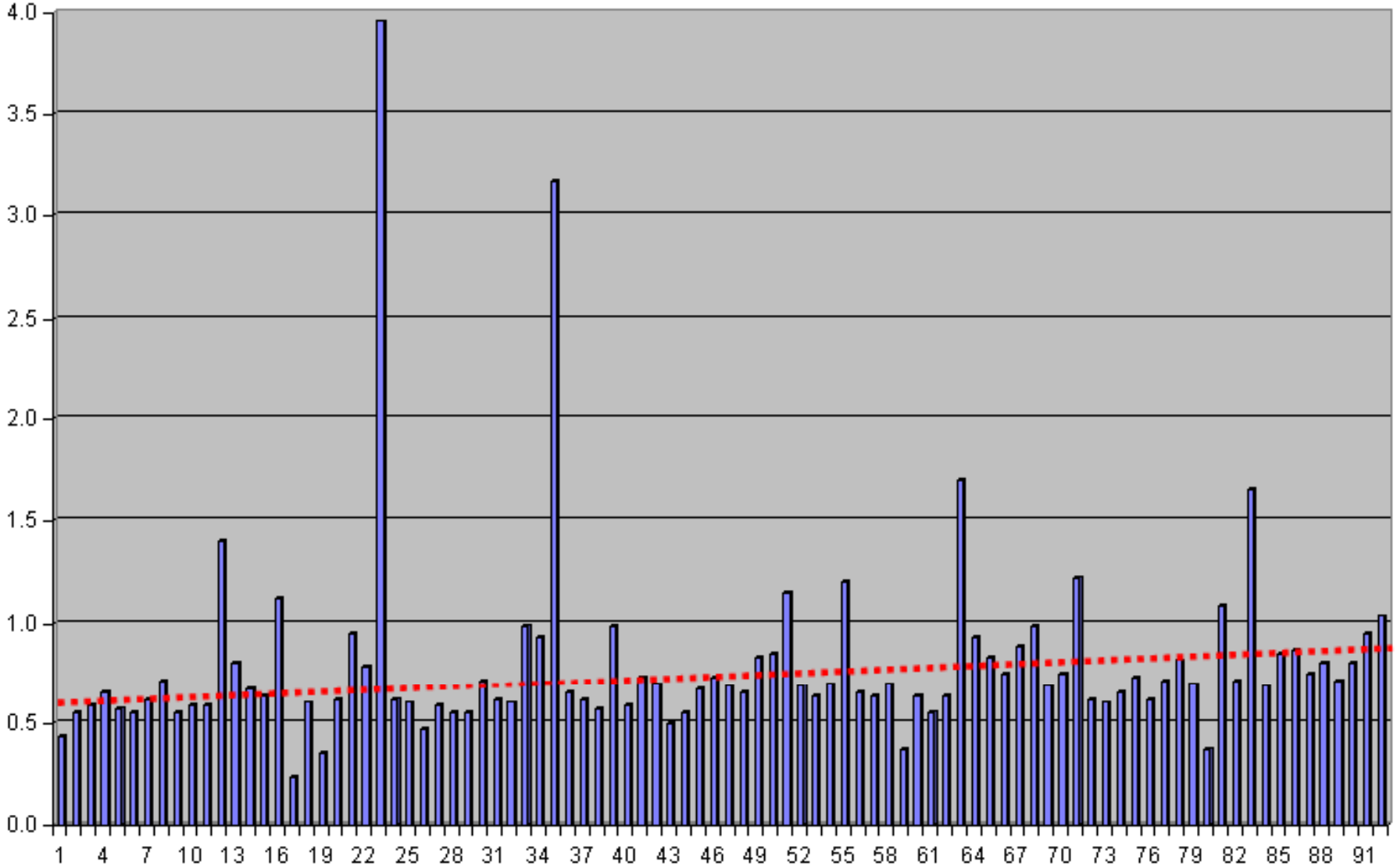
Tram to Crusher Time in Min



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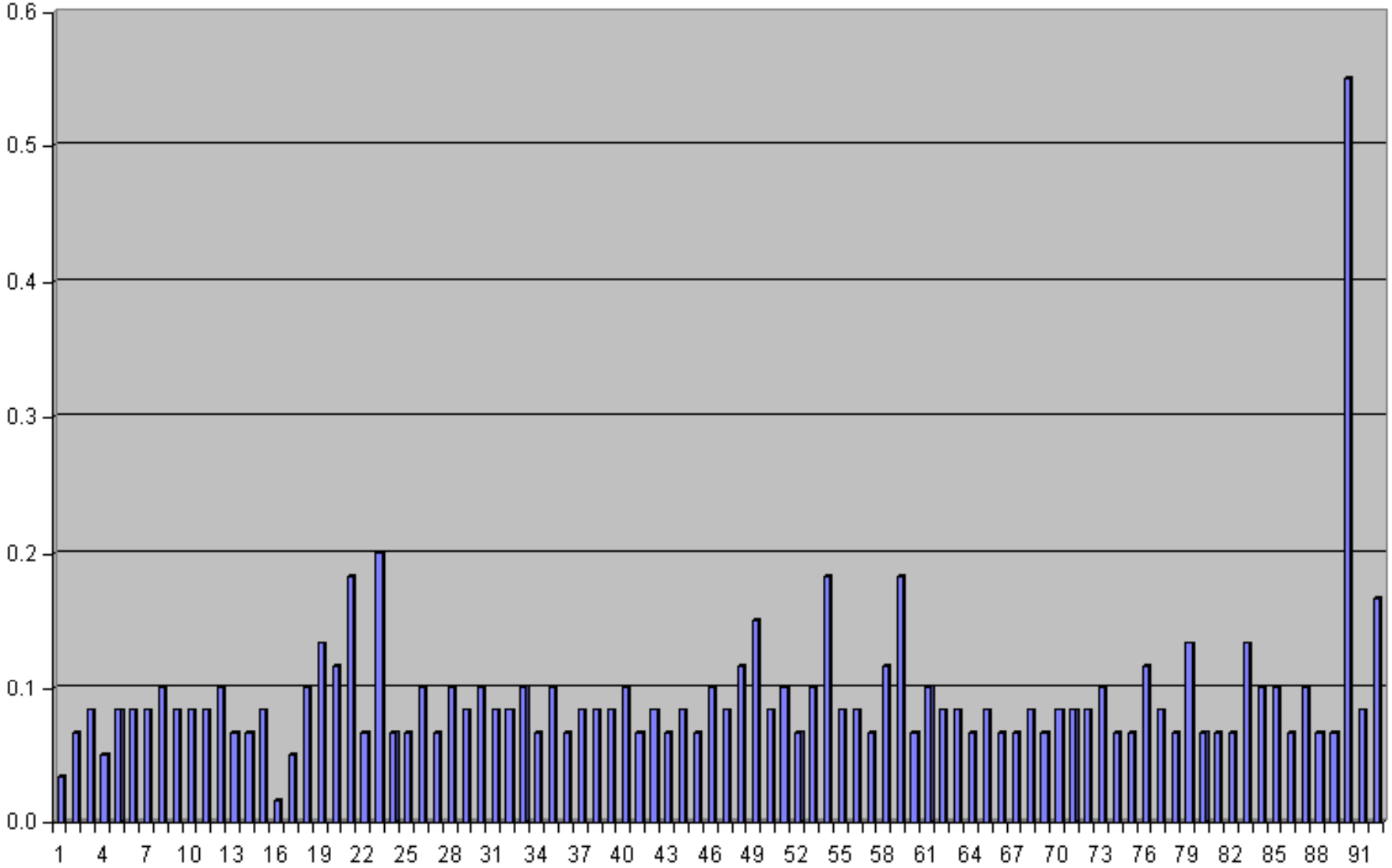
Dump into Crusher in Minutes



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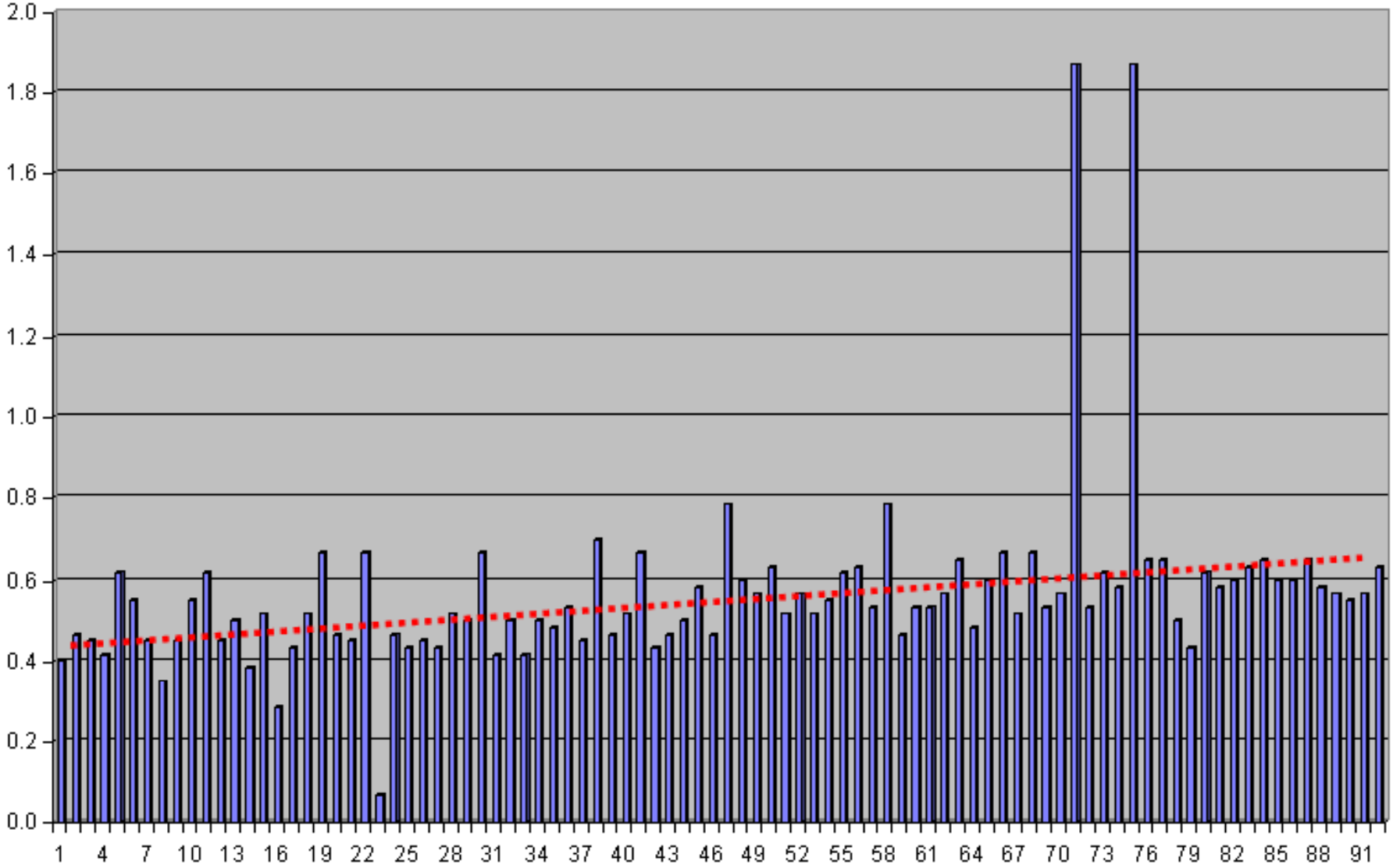
Tram time to Face in Minutes



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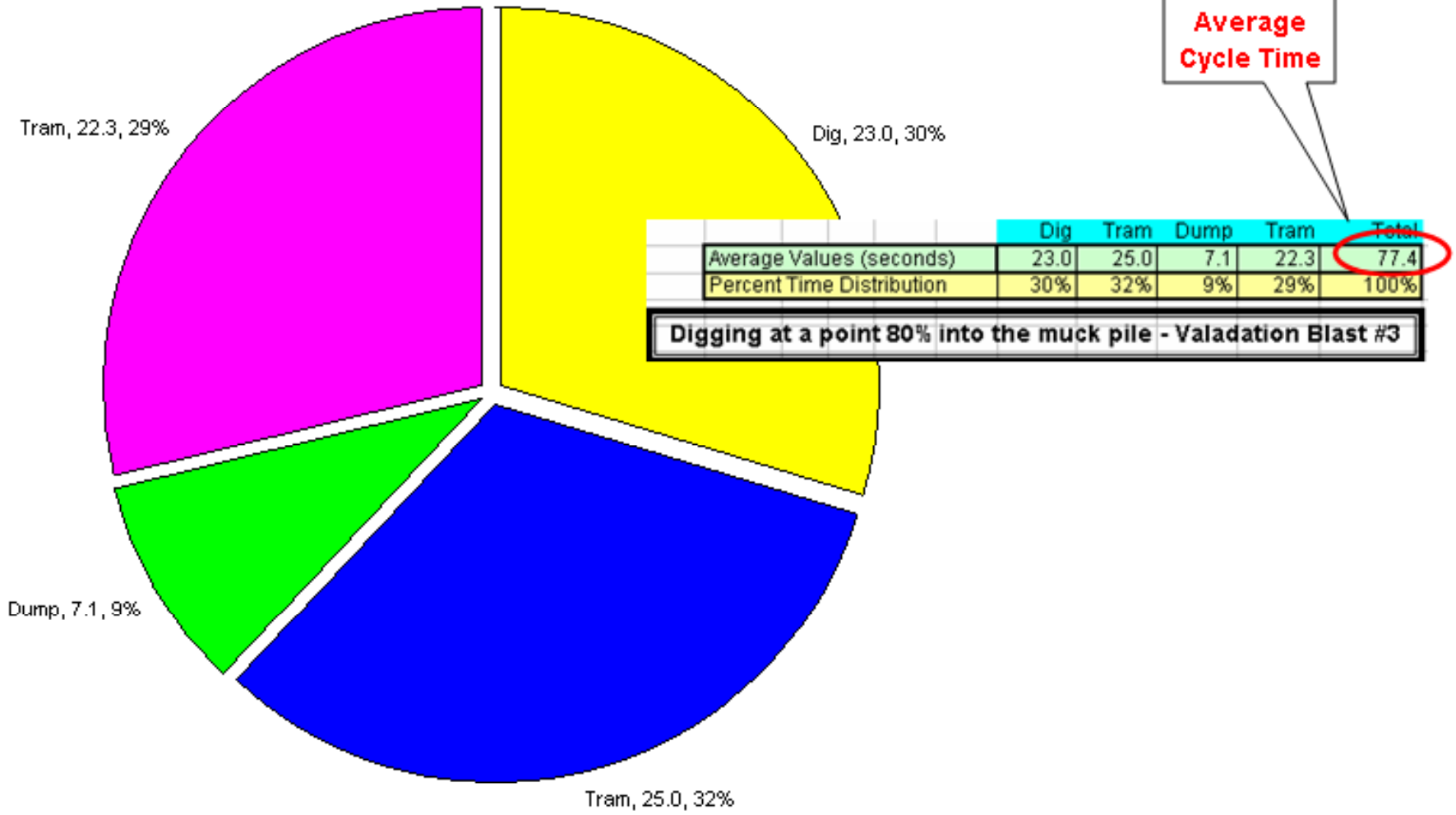
988 G Loader - Segment Cycle Times - Shot rock to Crusher
(Activity /// Time in Seconds /// % of Cycle)
March 27, 2007 - Holt's Summit Quarry



	Dig	Tram	Dump	Tram	Total
Average Values (seconds)	23.0	25.0	7.1	22.3	77.4
Percent Time Distribution	30%	32%	9%	29%	100%

Digging at a point 80% into the muck pile - Valadation Blast #3

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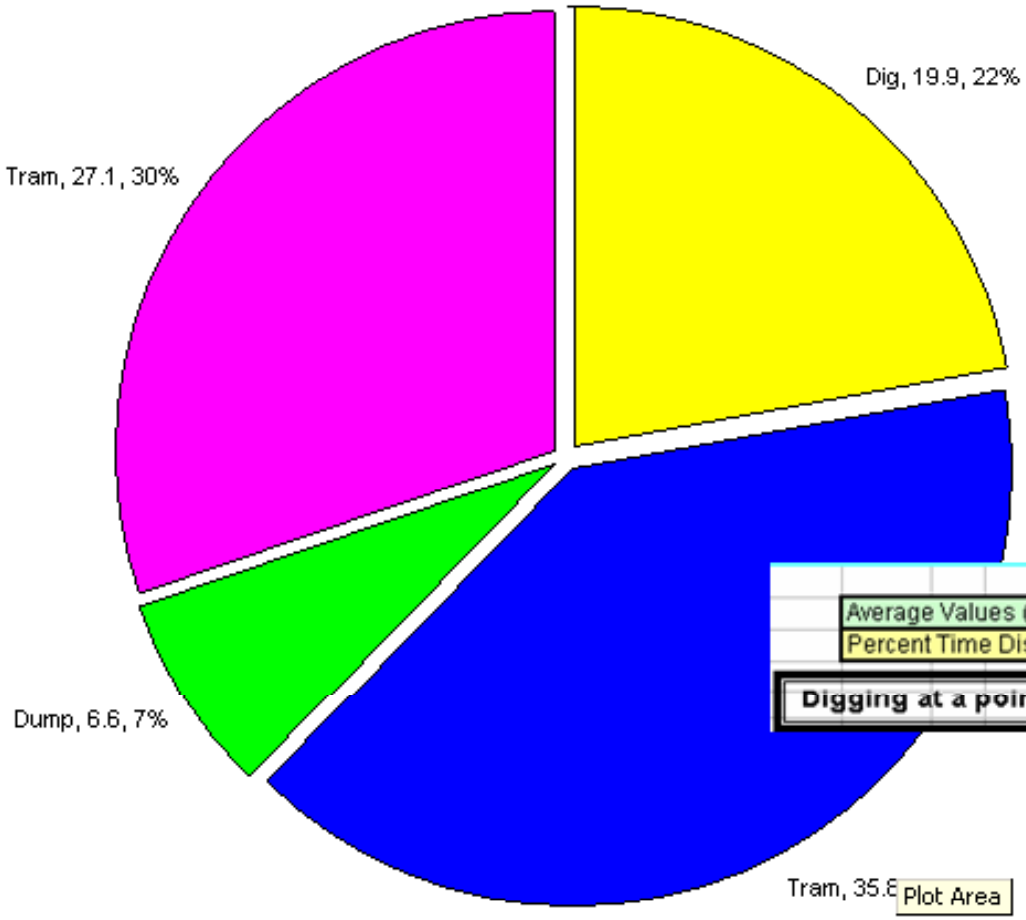
988 G Loader - Segment Cycle Times - Shot rock to Crusher
(Activity /// Time in Seconds /// % of Cycle)
March 28, 2007 - Holt's Summit Quarry



Total Average Cycle Time

	Dig	Tram	Dump	Tram	Total
Average Values (seconds)	19.9	35.8	6.6	27.1	89.3
Percent Time Distribution	22%	40%	7%	30%	100%

Digging at a point 95% into the muck pile - Valadation Blast #3

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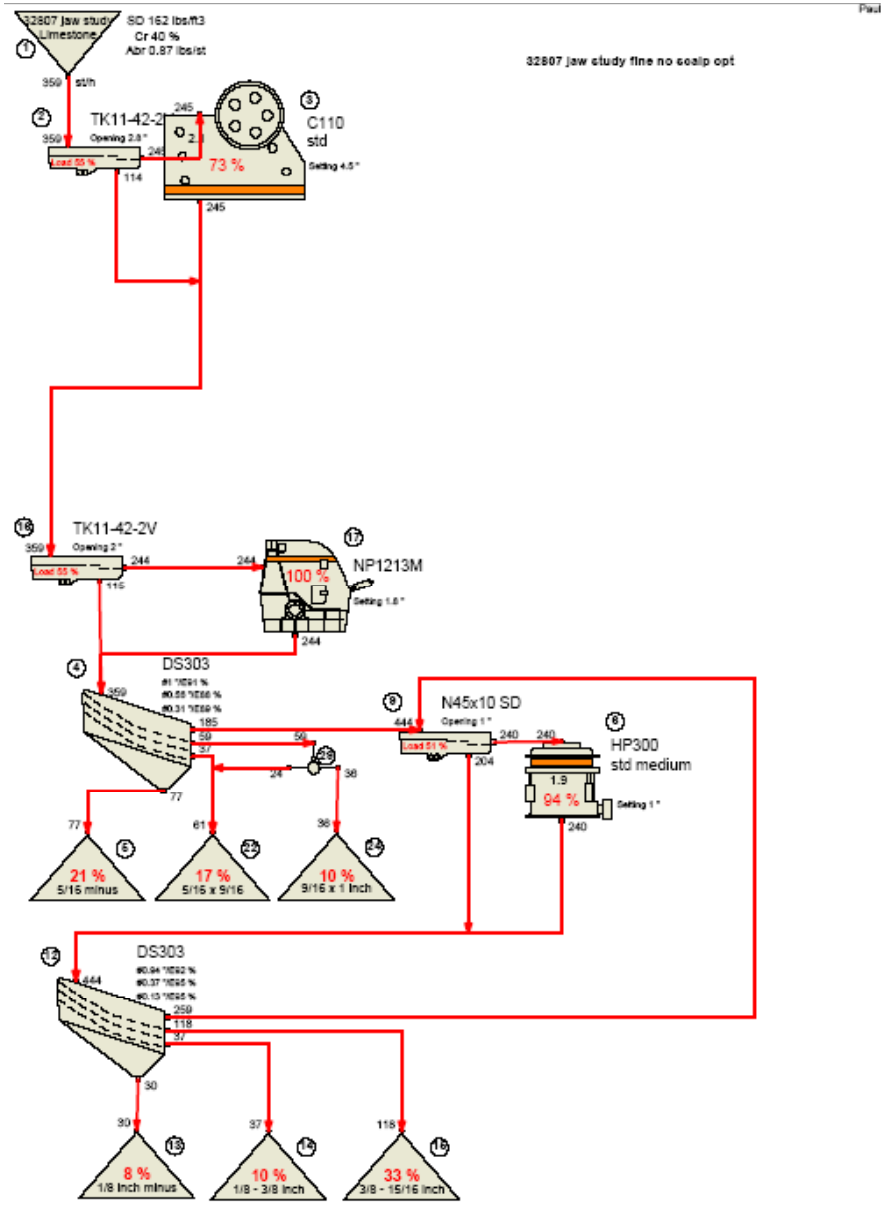
Bruno Model

April 2007

Production



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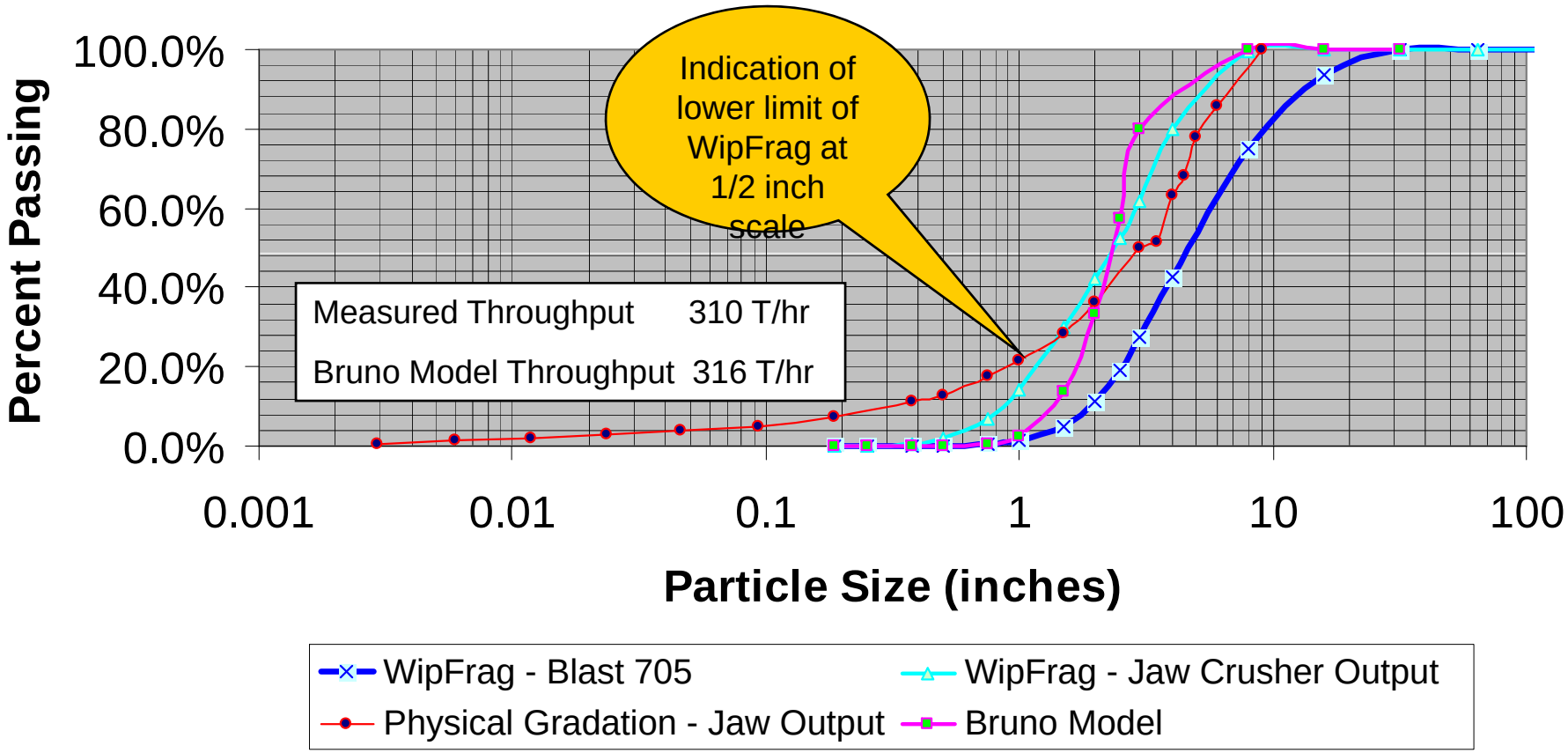
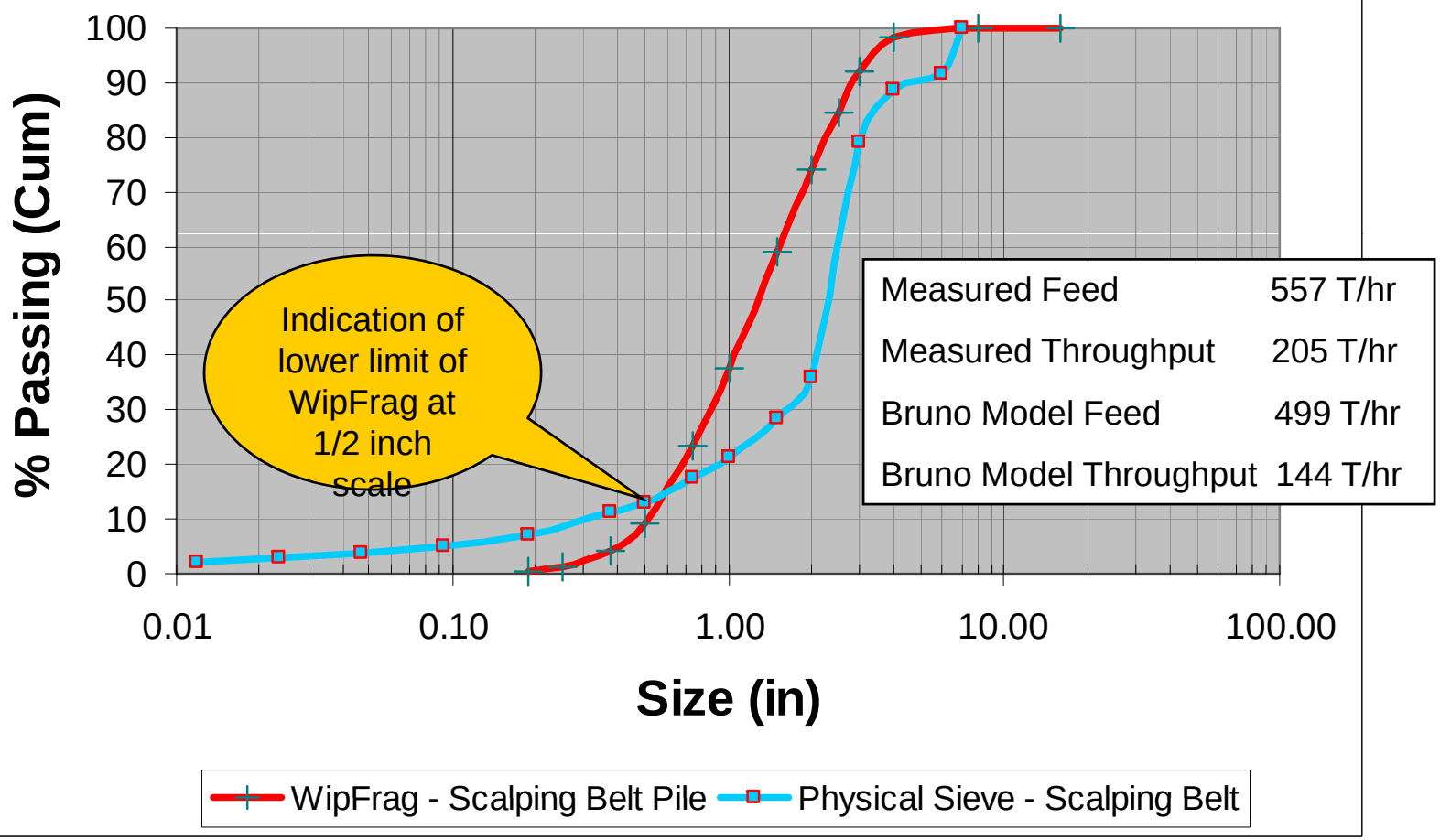
July 5, 2006 Jaw Crusher Study

Jaw Fragmentation (without scalping)



April 5, 2007 Jaw Study
Scalping Belt Fragmentation



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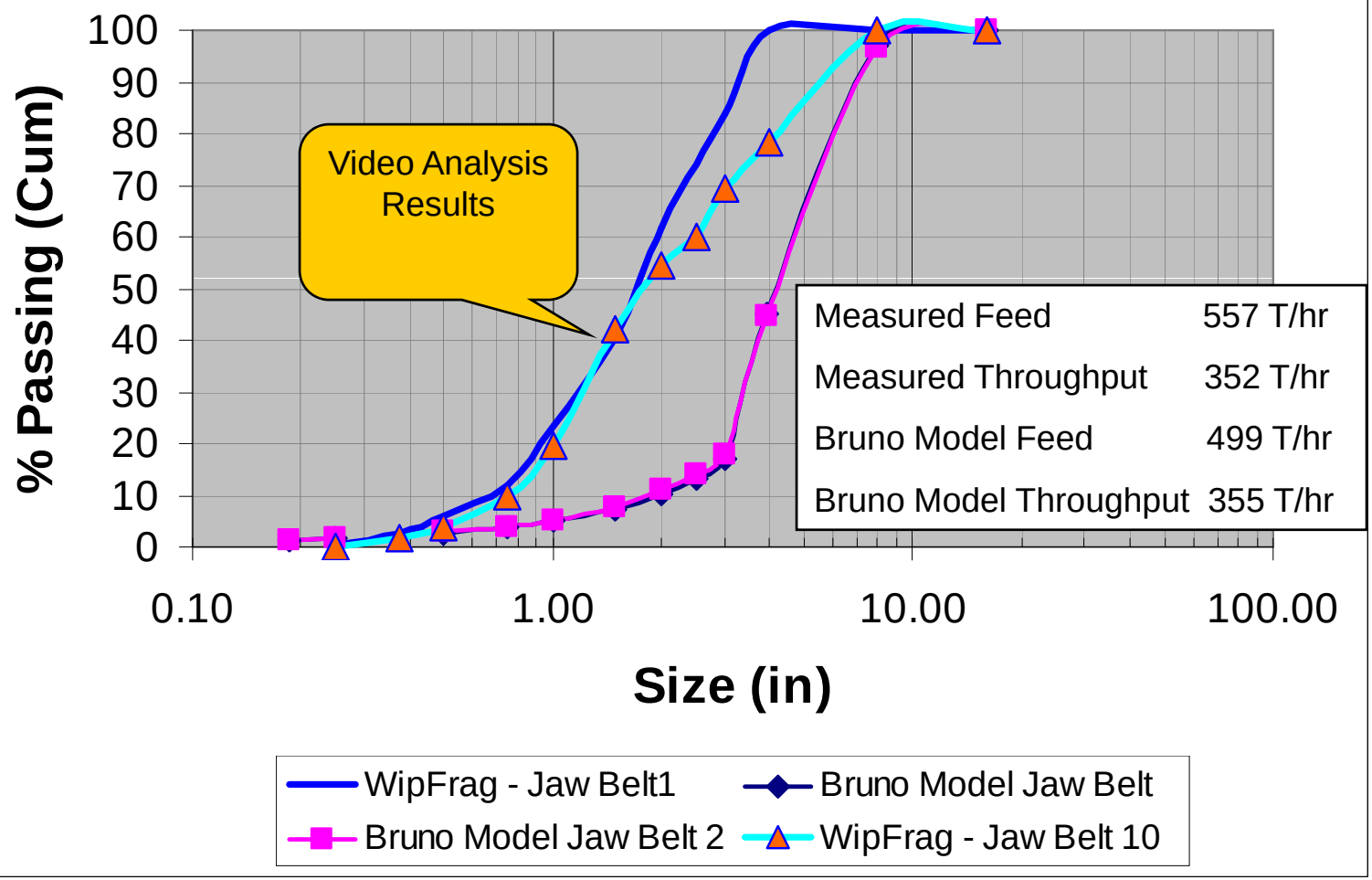
April 5, 2007 Jaw Study
Jaw Belt Fragmentation



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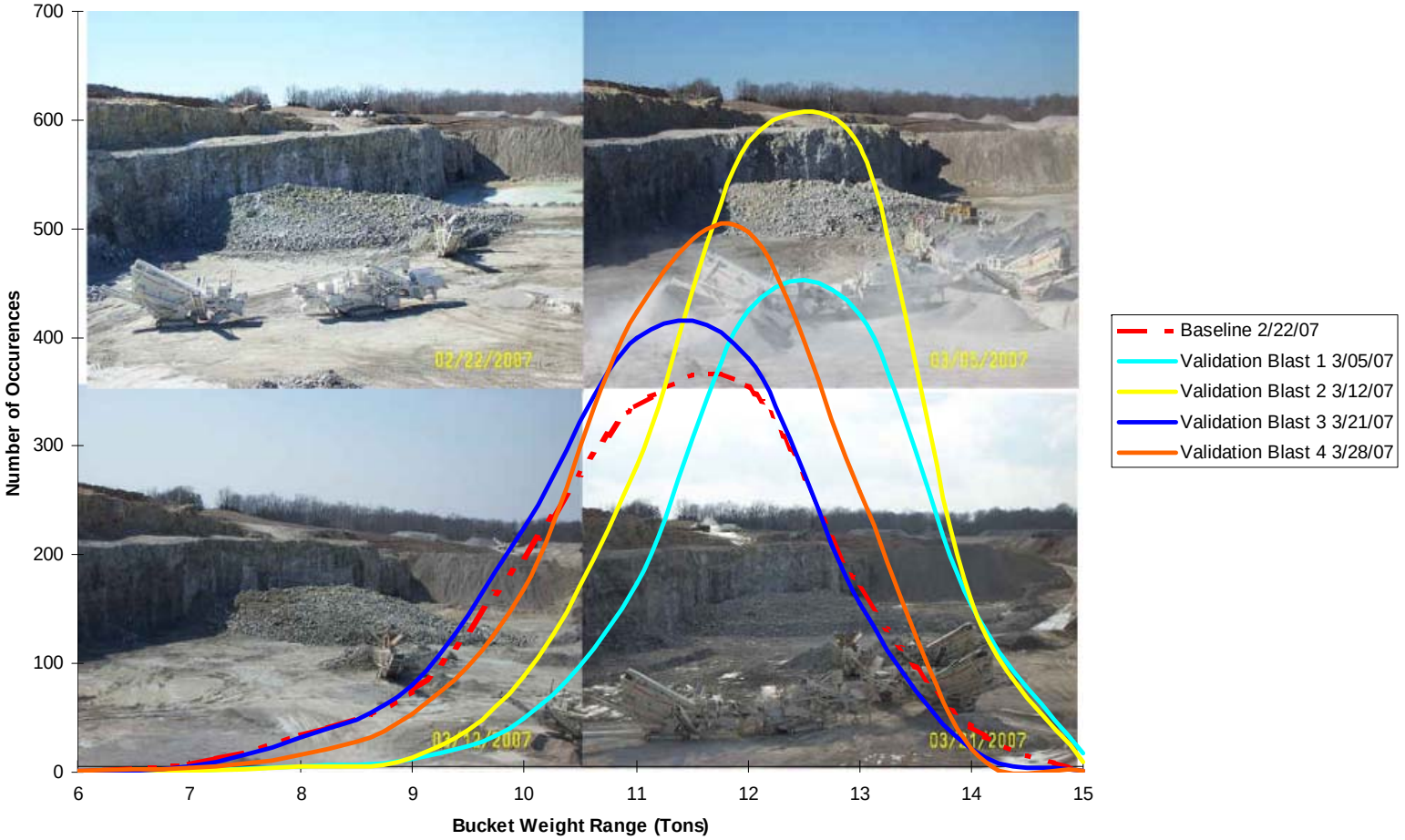
Distribution of Bucket Weights for CAT 988H on Total Shot Basis



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Program Data Summary from LOADRITE PitBoss System

		CAT 988H					
	Date	#	Avg	Avg	% Buckets	Crusher	Daily
		Cycles	Cycle Time	Bucket	over 12 ton	Feed Rate	In-Pit
		per		Weight		(overall)	Crushing
		Shift	min:secs	tons		tons/hr	Tons/shift
Baseline	23-Feb	255	2:08	10.91	25.88%	377.03	2,771
Baseline	26-Feb	253	2:18	11.54	38.91%	363.6	2,759
Baseline	27-Feb	249	1:49	11.48	34.68%	378.95	2,850
Baseline	28-Feb	204	2:25	12.42	66.50%	308.57	2,484
Baseline	1-Mar	273	1:44	12.47	68.13%	433.55	3,403
Total		**1,234**					**14,267**
Average			**2:04**	**11.76**	**46.82%**	**372.34**	
Validation Blast #1	5-Mar	341	1:24	12.69	76.90%	543	4,302
Validation Blast #1	6-Mar	344	1:26	12.69	79.88%	532.4	4,352
Validation Blast #1	7-Mar	298	1:27	13.26	90.57%	484	3,950
Validation Blast #1	8-Mar	115	1:27	13.01	81.74%	540	1,496
Validation Blast #1	9-Mar	165	1:46	12.56	72.70%	506.5	2,073
Total		**1,263**					**16,173**
Average			**1:30**	**12.84**	**80.36%**	**521.18**	
Validation Blast #2	13-Mar	237	2:07	12.27	61.18%	349.3	2,908
Validation Blast #2	14-Mar	299	1:36	12.71	75.59%	463.5	3,800
Validation Blast #2	15-Mar	321	1:30	12.96	83.49%	519.8	4,158
Validation Blast #2	16-Mar	302	1:36	13.25	91.72%	488	4,002
Validation Blast #2	19-Mar	256	1:40	12.27	63.53%	442	3,141
Validation Blast #2	20-Mar	256	1:40	12.27	63.53%	442.4	3,366
Total		**1,671**					**21,375**
Average			**1:41**	**12.62**	**73.17%**	**450.83**	
Validation Blast #3	22-Mar	321	1:33	11.84	44.24%	470.1	3,801
Validation Blast #3	23-Mar	300	1:37	12.19	60.67%	456.9	3,655
Validation Blast #3	26-Mar	218	1:12	11.52	33.49%	579.58	2,511
Validation Blast #3	27-Mar	241	1:59	11.53	39.83%	350.11	2,801
Validation Blast #3	28-Mar	221	1:39	11.04	29.86%	406.5	2,439
Total		**1,301**					**15,207**
Average			**1:36**	**11.62**	**41.62%**	**452.64**	
Validation Blast #4	29-Mar	253	1:49	12.24	62.45%	407.4	3,097
Validation Blast #4	2-Apr	223	1:46	12.15	60.27%	349.4	2,709
Validation Blast #4	3-Apr	213	1:53	11.97	53.99%	318.6	2,549
Validation Blast #4	4-Apr	251	1:50	12.14	55.78%	380.9	3,047
Validation Blast #4	5-Apr	241	1:59	12.07	56.85%	350.6	2,910
Validation Blast #4	6-Apr	261	1:33	11.5	35.25%	375.3	3,002
Total		**1,442**					**17,314**
Average			**1:48**	**12.01**	**54.10%**	**363.70**	

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Eric Strope, President Capital Quarries Company, Inc.

Expectations & Results

Video 3

Executive Summary

- **Impressive cost savings and increases in plant tonnage throughput within the "Blast to 1 inch minus" process of the Holt Summit Value Map were realized over the validation phase of the project.**
- **Drilling and Blasting cost increased by 28%.**
- **Waste was reduced by 19%.**
- **The standard cost model for the "Blast to 1 inch minus" process of the Holt Summit value map shows over the total process:**
  - ✓ **10% to 27% increase in crusher plant capacity**
    - **Baseline of 373 TPH to an average of 475 TPH = +102 TPH shift in capacity.**
  - ✓ **17% to 31% reduction in net total cost per ton (with scalping)**
  - ✓ **Even when scalping is not utilized an 8.8% reduction in the net cost per ton was achieved.**

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What questions do you have?

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