

Royal Oak Mines Inc.
NWT Division - Giant Mine

To: J. Stard
From: P. Carroll
Subject: Arsenic Stope #15 Development
Date: July 29, 1997

Several different cost and scheduling alternatives for the completion of Arsenic stope #15 have been prepared for comparison (see attached tables). The purpose of this exercise is to determine the most practical and cost effective alternative for the stope development. The estimated remaining storage time for Arsenic stope #14 is 7 months from August 1st (Feb.1998). Stope #15 will have storage capacity for 6 years if fully developed.

The alternatives are as follows:

- 1) Royal Oak completing the stope development based on the current 5 day work schedule
- 2) Royal Oak completing the stope development based on a 6 day work schedule
- 3) A Contractor completing the stope development based on a 7 day work schedule
- 4) Royal Oak completing half the stope on a 5 day work schedule
- 5) Contractor completing half the stope on a 7 day work schedule

Arsenic stope #14 has an estimated life span of 7 months from August 1st. Estimated completion dates for alternatives 1 & 2 are beyond the life span of stope #14. These alternatives would not be practical (see attached tables). Total estimated cost for these alternatives is \$1,598,502.

Alternative 3 would have the stope development completed 25 days prior to the end of stope #14's life. The cost of having a contractor complete the stope is \$227,600 higher than Royal Oak's cost to complete the stope.

With alternative 4 Royal Oak would complete half the stope and will allow for approximately three years storage. The estimated cost for Royal Oak to complete half of the development is \$858,113.

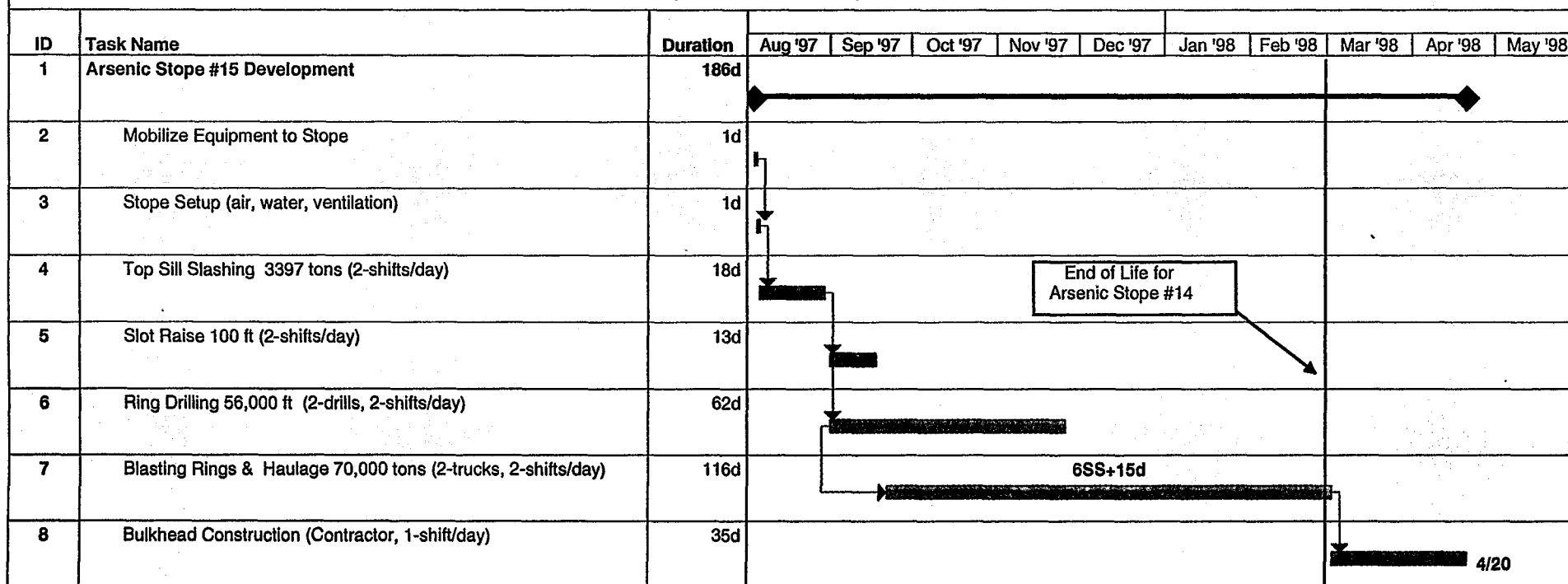
Alternatives 3, 4 & 5 are the only practical options for completion before the end of stope #14's life. Depending on Royal Oak's future plans for the possible marketing of a purified arsenic product alternative 4 would be the most cost effective. The cost of having a contractor complete half the stope is \$249,398 higher than Royal Oak's cost.

CC: D. Gratton, R. Moore

Alternative 1

Based on Current 5 day work schedule

Royal Oak Mines Inc.
Arsenic Stope #15
Development Schedule for Stope Completion



Royal Oak Mines Inc.
NWT Division - Giant Mine

Arsenic Stope #15 Development Cost Estimate

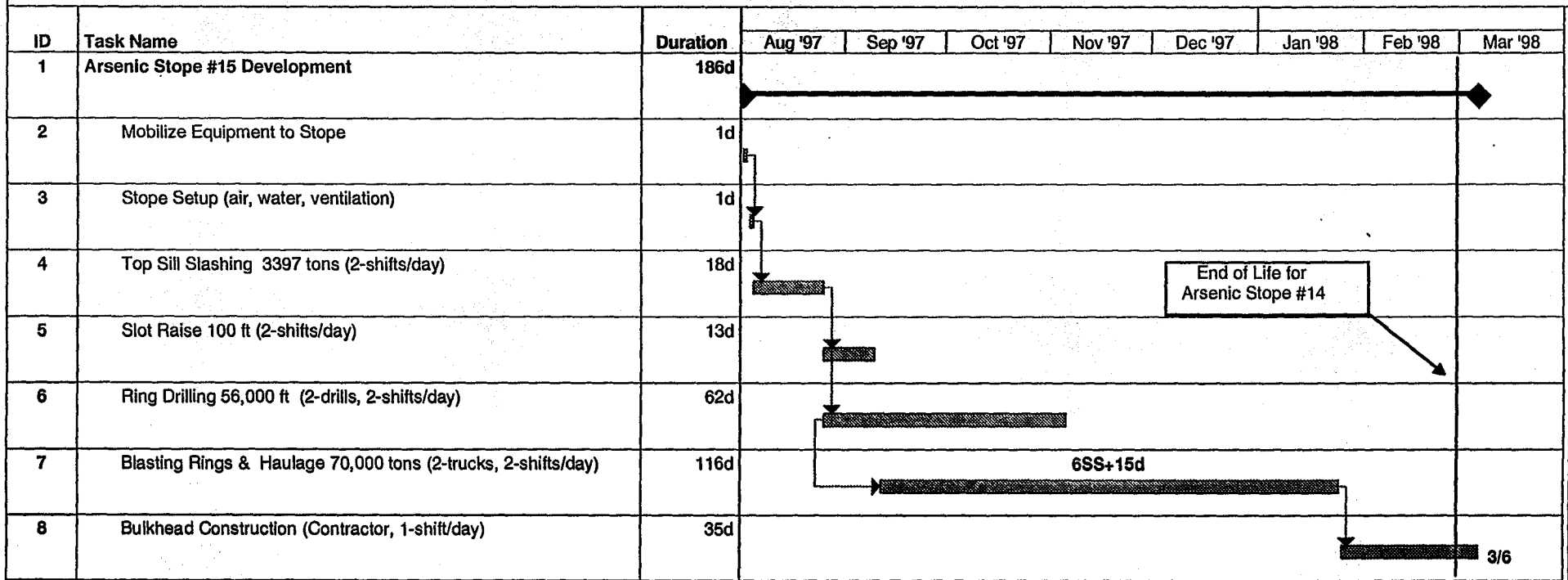
Open Volume= 987,000
 Storage Capacity= 27,636
 Duration= 6 years

Item	Units	Cost/Unit	Total
Top Sill Slashing (tons)	3,397	\$15.24	\$51,770
Slot Raise (ft)	100	\$190.00	\$19,000
Stope Drilling (ft)	56,000	\$3.80	\$212,800
Stope Blasting & Mucking (tons)	70,000	\$7.94	\$555,800
EJC 100 Scoop Rental (months)	7	\$9,500.00	\$66,500
(2) EJC 416 Trucks (months)	7	\$22,700.00	\$158,900
Equip. Mob & Demob	ls	\$40,000.00	\$40,000
Truck Haulage to Surface (tons)	73,397	\$2.77	\$203,310
Truck Haulage on Surface (tons)	73,397	\$1.00	\$73,397
4" Pipe (ft)	500	\$2.19	\$1,095
6" Pipe (ft)	300	\$3.22	\$966
(2) Ventilation Fans	2	\$6,000.00	\$12,000
24" Vent Bag (ft)	1,400	\$1.89	\$2,646
Engineering Bulkhead Design	ls	\$5,000.00	\$5,000
Bulkhead Construction	ls	\$50,000.00	\$50,000
Sub-total			\$1,453,184
Contingency (10%)			\$145,318
Total			\$1,598,502

Alternative 2

Based on a 6 day work schedule

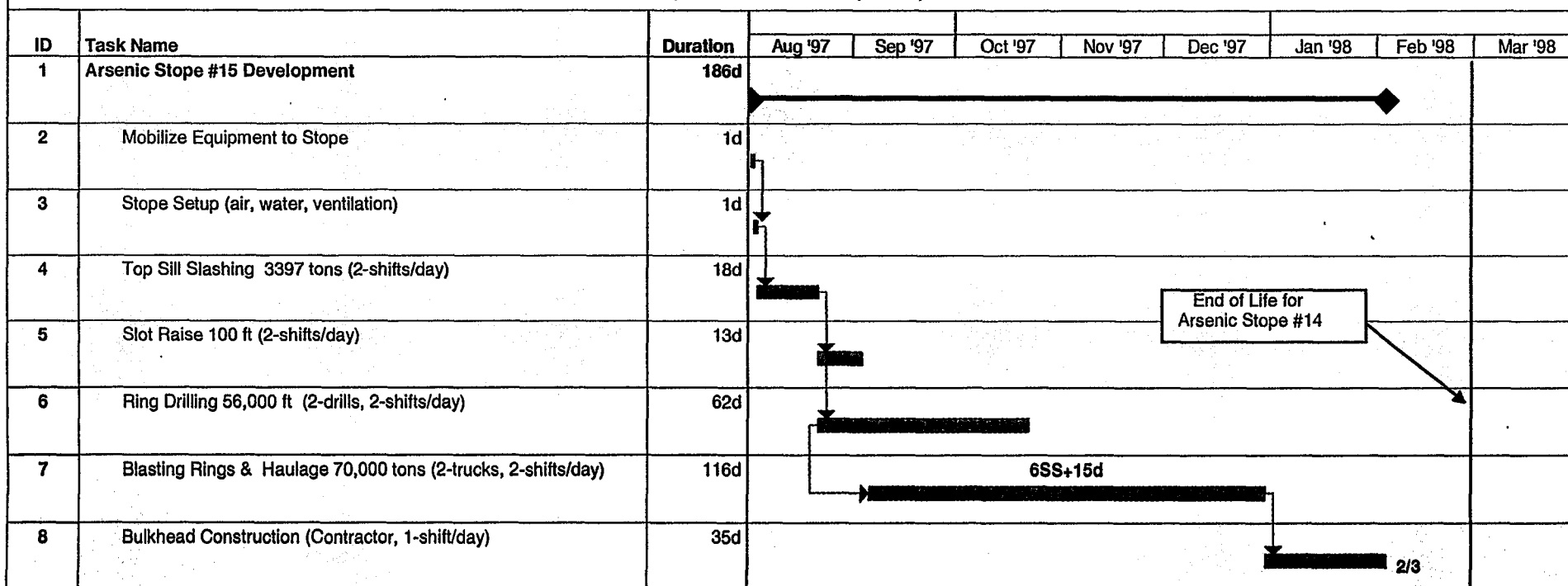
Royal Oak Mines Inc.
Arsenic Stope #15
Development Schedule for Stope Completion



Alternative 3

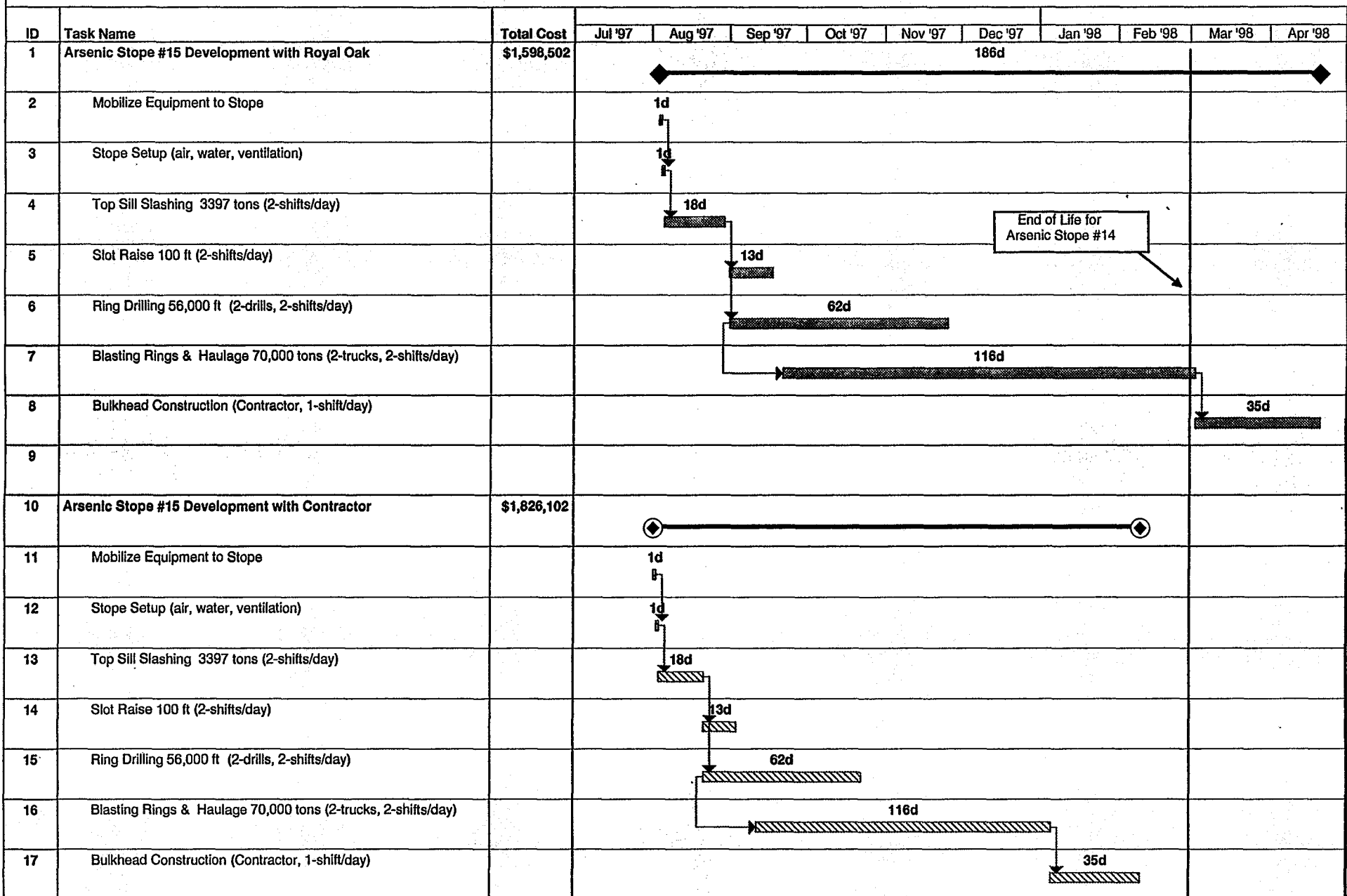
Based on work performed by contractor
on a 7 day work schedule

Royal Oak Mines Inc.
Arsenic Stope #15
Development Schedule for Stope Completion



Royal Oak based on current 5 day work schedule
Contractor based on 7 day work schedule

Royal Oak Mines Inc.
Arsenic Stope #15
Development Schedule for Stope Completion



Royal Oak Mines Inc.
NWT Division - Giant Mine

Arsenic Stope #15 Development Cost Estimate
 Work Performed by Contractor

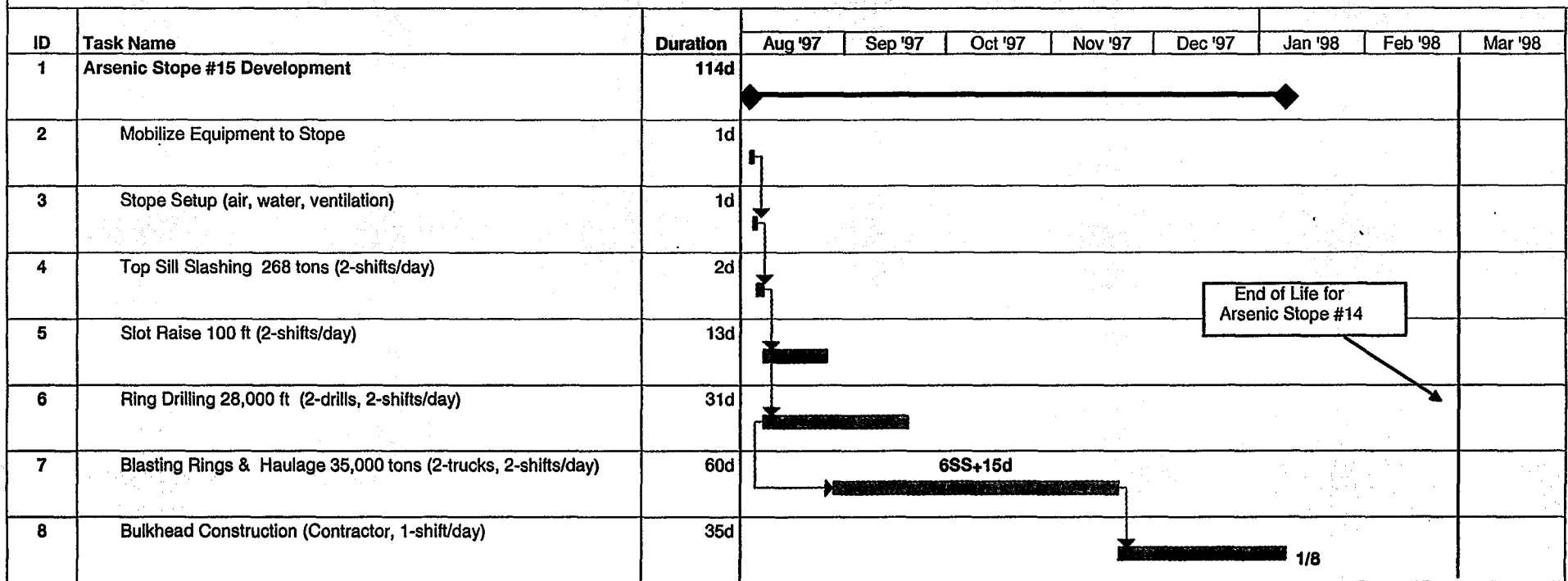
Open Volume= 987,000
 Storage Capacity= 27,636
 Duration= 6 years

Item	Units	Cost/Unit	Total
Top Sill Slashing (tons)	3,397	\$28.03	\$95,223
Slot Raise (ft)	100	\$212.74	\$21,274
Stope Drilling (ft)	56,000	\$3.80	\$212,800
Stope Blasting & Mucking (tons)	70,000	\$13.08	\$915,418
Equip. Mob & Demob	Is	\$100,000	\$100,000
Truck Haulage on Surface (tons)	73,397	\$2.50	\$183,493
4" Pipe (ft)	500	\$2.19	\$1,095
6" Pipe (ft)	300	\$3.22	\$966
24" Vent Bag (ft)	1,400	\$1.89	\$2,646
Engineering Bulkhead Design	Is	\$5,000	\$5,000
Bulkhead Construction	Is	\$50,000	\$50,000
Sub-total			\$1,587,915
Contingency (15%)			\$238,187
Total			\$1,826,102

Alternative 4

Based on current 5 day work schedule

Royal Oak Mines Inc.
Arsenic Stope #15
Development Schedule for Partial Stope Completion



Royal Oak Mines Inc.
NWT Division - Giant Mine

Arsenic Stope #15 Development Cost Estimate
 for Completion of 1/2 of the Stope

Open Volume= 493,500
 Storage Capacity= 13,818
 Duration= 3 years

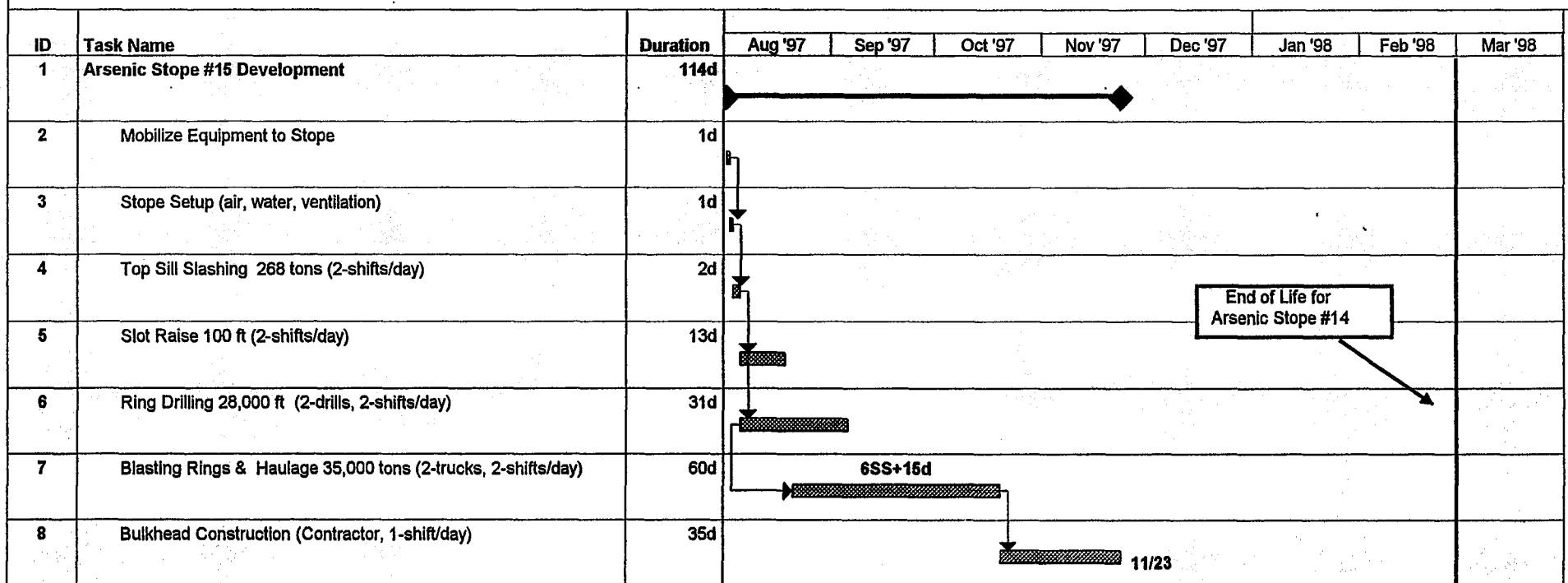
Item	Units	Cost/Unit	Total
Top Sill Slashing (tons)	268	\$15.24	\$4,084
Slot Raise (ft)	100	\$190.00	\$19,000
Stope Drilling (ft)	28,000	\$3.80	\$106,400
Stope Blasting & Mucking (tons)	35,000	\$7.94	\$277,900
EJC 100 Scoop Rental (months)	4	\$9,500.00	\$38,000
(2) EJC 416 Trucks (months)	4	\$22,700.00	\$90,800
Equip. Mob & Demob	ls	\$40,000.00	\$40,000
Truck Haulage to Surface (tons)	35,300	\$2.77	\$97,781
Truck Haulage on Surface (tons)	35,300	\$1.00	\$35,300
4" Pipe (ft)	250	\$2.19	\$548
6" Pipe (ft)	200	\$3.22	\$644
(2) Ventilation Fans	2	\$6,000.00	\$12,000
24" Vent Bag (ft)	1,400	\$1.89	\$2,646
Engineering Bulkhead Design	ls	\$5,000.00	\$5,000
Bulkhead Construction	ls	\$50,000.00	\$50,000
Sub-total			\$780,103
Contingency (10%)			\$78,010
Total			\$858,113

Alternative 5

Based on work performed by contractor
on a 7 day work schedule

Royal Oak Mines Inc.
Arsenic Stope #15

Development Schedule for Partial Stope Completion Performed by Contractor



Royal Oak Mines Inc.

NWT Division - Giant Mine

Arsenic Stope #15 Development Cost Estimate
for Partial Stope Completion with Work Performed by Contractor

Open Volume= 987,000

Storage Capacity= 13,818

Duration= 3 years

Item	Units	Cost/Unit	Total
Top Sill Slashing (tons)	268	\$36.88	\$9,885
Slot Raise (ft)	100	\$212.74	\$21,274
Stope Drilling (ft)	56,000	\$3.80	\$212,800
Stope Blasting & Mucking (tons)	35,000	\$13.49	\$472,007
Equip. Mob & Demob	ls	\$100,000	\$100,000
Truck Haulage on Surface (tons)	35,300	\$2.50	\$88,250
4" Pipe (ft)	250	\$2.19	\$548
6" Pipe (ft)	200	\$3.22	\$644
24" Vent Bag (ft)	1,400	\$1.89	\$2,646
Engineering Bulkhead Design	ls	\$5,000	\$5,000
Bulkhead Construction	ls	\$50,000	\$50,000
Sub-total			\$963,053
Contingency (15%)			\$144,458
Total			\$1,107,511