This chapter presents the Agency's preliminary conclusions regarding the regulatory impacts of implementing the options presented in today's proposed rule. The chapter is organized around the central elements of the analyses provided in previous chapters, namely characterizing the affected population of waste streams, facilities, and mineral industry sectors, analyzing the cost and economic impacts of implementing the options, and assessing the human health benefits of adopting these regulatory alternatives.

7.1 THE AFFECTED UNIVERSE

As described above and in further depth in a companion technical background document prepared in support of today's proposed rule, EPA has conducted intensive research in an attempt to identify and characterize all of the waste streams that might be affected by imposition of LDR requirements on non-exempt hazardous mineral processing wastes. This research has yielded a group of 148 potentially hazardous mineral processing residues that may be subject to Subtitle C controls and accordingly, to new LDR treatment standards.

This number is far smaller than the total population of mineral industry wastes, and reflects EPA's step-wise process of eliminating from the analysis wastes that are: 1) generated by extraction and beneficiation operations (these are Bevill-exempt), 2) the 20 exempt special mineral processing wastes, and 3) wastes that are known or expected to be non-hazardous. The remaining waste streams have been included in the Agency's analyses, though in many cases substantial uncertainties regarding their generation rates, chemical characteristics, and management practices have led EPA to develop several different estimates of these parameters, which in turn produce highly variable estimates of costs and benefits arising from new regulatory controls.

The Agency recognizes the limitations that these data gaps and simplifying assumptions impose on the accuracy of the analyses presented above. EPA has provided detailed analyses of the potential cost and benefit impacts of the LDR options in the interests of providing interested parties with as much pertinent information as possible. The Agency solicits comment on the data underlying all of these analyses and findings.

7.2 COST AND ECONOMIC IMPACTS OF THE RULE

A summary of the projected costs of implementing the two major options presented in today's proposed rule is provided in Exhibit 7-1, below. Option 1 is the more costly of the two, for reasons that are discussed below.

Exhibit 7-1

Summary of Costing Analysis Results
(Results in $ Millions per Year)

Option[a]	Costing Scenario	Baseline Assumption	
		Prior Treatment	No Prior Treatment
1 - Contingent Management	Minimum	7.5	58.7
	Expected	11.6	140.8
	Maximum	17.7	359.3
2 - Conventional LDRs	Minimum	0	50.9
	Expected	0	126.9
	Maximum	0	336.1

[a] Options are described in detail in Chapter 2 of this document.

Using the prior treatment baseline, impacts are estimated to be zero for Option 2 (conventional application of UTS), and to vary between $7.5 and $17.7 million annually for Option 1. Option 1 has an expected annualized impact of just under $12 million.

Estimated costs under the no prior treatment baseline, on the other hand are far more substantial. Even under the minimum cost case, incremental costs are about $51 million annually for Option 2 and almost $59 million for Option 1. Maximum cost estimates exceed $300 million per year for both options. In the expected case, impacts exceed $125 million per year for Option 2 and $140 million annually for Option 1.

As is evident from this table, estimated costs of implementing Options 1 and 2 are quite variable across both baseline assumptions and costing scenarios. The Agency believes that the two baselines presented in this RIA represent the extreme values of the population of facilities and waste streams to be affected by application of the LDRs. That is, actual impacts would likely be of intermediate magnitude between values derived for the prior treatment and no prior treatment baselines.

Option 1 would impose higher costs, in large part because it would imply new regulatory controls and associated costs on the storage of thirteen hazardous by-products and sludges that are recycled/reclaimed; these materials are not currently subject to regulation, nor would they be under Option 2. Implementation of Option 1 also would allow the affected facility operator to store material destined for reclamation for up to one year, in contrast to the 90 day storage allowed under Option 2 and current regulations. EPA has assumed that facility operators would avail themselves of this increased flexibility, in spite of the increased size (and cost) of the necessary storage units, so as to decouple waste recovery and normal production operations as much as possible.

A brief summary of the projected economic impacts of the rule, assuming the no prior treatment baseline, is summarized in Exhibit 7-2. Again, impact ratios are the annualized costs of compliance divided by annual value of shipments.

Exhibit 7-2

Summary of Economic Impact Screening Results:
No Prior Treatment Baseline

Option	Costing Scenario	Number of Sectors with Impact Ratios	
		Greater than 5 Percent	Greater than 10 Percent
1 - Contingent Management	Minimum	1	1
	Expected	12	7
	Maximum	16	13
2 - Conventional LDRs	Minimum	2	2
	Expected	12	8
	Maximum	17	14

Estimated impacts under the two options, assuming the no prior treatment baseline, are similar, with one more sector exceeding a given threshold impact under Option 2 than under Option 1. As discussed in Chapter 4, the magnitude of estimated impacts for some sectors is quite high, though the affected commodities are mostly co- or by-products of other mineral commodities. Accordingly, except in a few limited cases, even under the conservative assumptions employed in this analysis, it is unclear that imposition of new waste management controls under either Option 1 or Option 2 would threaten the economic viability of an entire mineral production facility, though certain operations (recovery of specific co-product mineral values) might be rendered non-economic.

For seventeen sectors where data for value added were available, EPA also compared regulatory costs to value added for each sector. Under Option 1, the screening level analysis based on value added showed that one-third of the sectors had severe impacts under the minimum cost scenario; most had severe impacts under the expected cost scenario; and nearly all had severe impacts under the maximum cost scenario.

For six industry sectors where profits data were available, EPA compared regulatory costs to profits. Under Option 1, the screening level analysis based profits data schowed that no sectors had severe impacts.

7.3 BENEFITS OF THE RULE

The benefits analysis is composed of a quantitative and a qualitative portion. The quantitative portion is in turn composed of two main approaches: the mean-concentration approach and the sample-specific approach.

Benefits of the Regulatory Options were measured against the no prior treatment baseline. Central tendency (CT) and high end (HE) risks were calculated for each waste stream using the average concentrations of key constituents found in EPA's waste stream data base. Only wastes for which constituent data of acceptable quality were available were included in the benefits analysis. Pre-LDR cancer risks for the waste streams varied from between approximately 10^{-8} to approximately 10^{-1} under CT conditions and from approximately 10^{-7} to almost unity (10^{0}) under HE conditions.

The range of pre-LDR noncancer hazard quotients across waste streams was also very wide, ranging from values less than 1.0 to over 10,000. Post-LDR cancer risks were much lower, reflecting the large reductions in constituent leachate concentrations which would need to be achieved if mineral processing waste came under the coverage of LDRs.

Using the approach described in Section 5.4.1, the numbers of facility-waste stream combinations at given risk levels associated with each waste stream were estimated. The mean-concentration benefits

assessment showed substantial numbers of facility-waste stream combinations moving from relatively high pre-LDR cancer risk categories to lower categories post-LDR under Options 1 and 2. The number of facility-waste stream combinations with cancer risks less than 10^{-5} increased from 30 to 36 under CT assumptions, and from 7 to 15 under HE assumptions under Option 1. In addition, The number of facility-waste stream combinations in higher-cancer risk categories decreased substantially from pre-LDR to post-LDR conditions.

Similarly, the mean-concentration benefits assessment showed substantial reductions in the numbers of facility-waste stream combinations moving from high noncancer hazard quotient categories to lower levels. Under CT assumptions, the number of combinations with hazard quotients less than 1.0 increased from 65 out of 136 to 136 out of 136; this indicates that under CT assumptions, LDR compliance would completely eliminate noncancer hazard quotients above levels of regulatory concern for all waste streams. Using HE assumptions, the pre-LDR number of facility-waste stream combinations with hazard quotients less than 1 increased from 6 to 57 post-LDR, and the numbers of combinations in categories with higher hazard quotient values were decreased substantially.

The sample-specific risk and benefits assessment used the chemical concentration data from individual waste samples, rather than the mean concentrations from all samples of given waste stream, as estimates of release concentrations. Benefits, expressed as changes in the numbers of facility-waste stream combinations in specific cancer risks or hazard quotient categories, were then calculated on the basis of the distribution of risks among the individual samples. In addition, several more waste streams were included in the sample-specific benefits assessment, on the basis of slightly revised data requirements, and post-LDR release concentrations were estimated to be one-half the UTS levels, rather than equal to the UTS concentrations as was assumed in the mean-concentration assessment. Otherwise, the risk assessment and benefits estimation methodologies and assumptions used in the sample-specific benefits assessment were the same as those used in the mean-concentration assessment.

The results of the sample-specific benefits assessment are summarized in Exhibit 7-3. The results of this assessment parallel and confirm, to a large extent, the results of the mean-concentration benefits analysis. Large shifts are seen in the distributions of facility-waste stream combinations from higher-cancer risk and hazard quotient categories pre-LDR to lower risk categories post-LDR, under both CT and HE assumptions, indicating that substantial health benefits from reduced groundwater exposure to toxic contaminants may be realized. The finding in the mean-concentration benefits assessment that all post-LDR CT hazard quotients would be reduced to levels less than 1.0 is also confirmed in the sample-specific benefits assessment. The sample-specific benefits assessment differs from the mean-concentration assessment, however, in that it indicates a somewhat higher proportion of facility-waste stream combinations would fall into lower risk and hazard quotient categories pre-LDR than does the mean-concentration approach. The overall benefits estimates generated by the two methods, in terms of the numbers of facilities that move from higher- to lower-risk categories, however, are roughly comparable.

The quantified benefits represent only a fraction of the total benefits expected from the four regulatory options. Non-quantified benefits include the following:

- Risk reductions from treated waste streams for which EPA does not have concentration data.
- Risk reductions from wastes treated to much less than the UTS levels post-LDR.
- Risk reductions from exposure pathways besides ingestion of contaminated groundwater (e.g., ingestion of contaminated drinking water from surface runoff, ingestion of food grown using contaminated water, inhalation of particulates).
- Risk reductions from receptors besides adult humans (e.g., children, other sensitive individuals, non-human receptors and ecosystems).
- Increase in non-use values (i.e., "existence value").

These and several other benefits are listed in Exhibit 5-6.

EXHIBIT 7-3
Sample-Specific Benefits Assessment Results:
Regulatory Options 1 and 2 Compared to the No Prior Treatment Baseline

Cancer Risk					Non-cancer Hazard Index				
	Central Tendency		High End			Central Tendency		High End	
Risk Category	Pre-LDR	Post-LDR	Pre-LDR	Post-LDR	Risk Category	Pre-LDR	Post-LDR	Pre-LDR	Post-LDR
$<10^{-5}$	68	71	43	50	<1	73	139	28	108
10^{-5} to 10^{-4}	13	46	33	31	1 to 10	35	0	56	65
10^{-4} to 10^{-3}	20	0	13	59	10 to 100	21	0	28	0
10^{-3} to 10^{-2}	12	0	17	0	100 to 1,000	6	0	42	0
10^{-2} to 10^{-1}	3	0	21	0	1,000 to 10,000	3	0	15	0
$>10^{-1}$	1	0	13	0	>10,000	1	0	5	0
Total	117	117	140	140	Total	139	139	174	173[a]

[a] This total is different from that in the previous column due to rounding.