Guidelines for a Present Value Determination

To establish the amount of money that needs to be invested in a long-term funding mechanism, the future costs need to be stated as a present value for the year the account will be established and start growing in value. To do this calculation, a standard present value analysis needs to be performed.

Discount Rate

A critical component to a present value calculation is determining the appropriate discount rate. For this type of analysis, the appropriate discount rate should reflect the anticipated net return on investment. To estimate the anticipated net return on investment, the BLM state director must first determine what financial instruments are appropriate and acceptable for such the funding mechanism (discussed in Attachment 2 – *Guidelines for Establishing a Long-Term Funding Mechanism*), and estimate the anticipated increase in value for those types of market instruments.

The choice of the discount rate to use in the analysis is not an insignificant matter and can be confusing; the responsible BLM office should consult the BLM state office economist if there are concerns about the appropriate discount rate to use.

Real versus Nominal Rates – Discount rates may be stated as real rates or nominal rates.

<u>Nominal Rates</u> – Of the acceptable financial instruments under 43 CFR 3809.555, U.S. Treasury, Municipal, and corporate bonds are the most appropriate for this type of investment. The interest rates U.S. Treasury, Municipal, or corporate bonds carry depends on several factors, including default risk, tax status, and maturity. Generally, the higher the default risk associated with the bond, the higher the interest rate; tax exempt instruments generally come with a lower interest rate; and the longer the term of the bond, the higher the interest rate. Table 1, *Reported Bond Interest Rates*, provides examples of the interest rates for U.S. Treasury, Municipal, and corporate bonds reported for two time periods (May 28, 2002 and May 6, 2002).

Table 1
Reported Bond Interest Rates

Debt Securities	Interest Rate May 28, 2002	Interest Rate May 6, 2002
10-Year U.S. Treasury	5.12	5.05
10-Year AAA Municipal Bond	4.03	4.01
10-Year AA Municipal Bond	4.00	3.98
10-Year AAA Corporate Bond	5.62	5.62
10-Year AA Corporate Bond	5.91	5.99
30-Year U.S. Treasury	5.66	5.53
20-Year AAA Municipal Bond	4.88	4.83
20-Year AA Municipal Bond	4.89	4.85
20-Year AAA Corporate Bond	6.28	6.20
20-Year AA Corporate Bond	6.58	6.61

The rates in Table 1 are actual market rates that are typically reported in the financial section of most large newspapers. These rates reflect the anticipated return on investment associated with each investment. They are reported market rates and, as such, the interest rates include the anticipated effect of inflation that is expected to occur over the term of the financial instrument, i.e., they are nominal interest rates.

Data Sources – A number of sources exist that provide assumptions on discount rates and future inflation rates. One such source is the U.S. Government's Office of Management and Budget (OMB). Among other functions, OMB provides guidance to Federal agencies on what discount rates to use when conducting benefit-cost and cost-effectiveness analyses. Although the analysis required in establishing the amount of a trust fund is not identical to a cost-effectiveness analysis, the OMB guidance is still useful and relevant.

Annually OMB issues its guidance on discount rates in Circular A-94, Appendix C, *Discount Rates for Cost-Effectiveness, Lease Purchase, and Related Analyses* (*http://www.whitehouse.gov/omb/circulars/a094/a094.html*). Appendix C is updated annually and presents nominal and real discount rates for both public and private funded projects. For Federally funded projects the discount rate is based on the government's current cost of borrowing, or current interest rates from U.S. Treasury notes and bonds. For example, Appendix C revised January 2003 sets the 30-year real interest rate at 3.2 percent and the 30-year nominal rate at 5.1 percent. The OMB Circular also provides discount rate guidance for private-funded projects. For these projects, the recommended rate is based on an estimate of the marginal pretax rate of return on an average investment in the private sector in recent years.

Real Rates – Where the cost inputs used in the analysis are real or constant-dollar inputs, the discount rate must also be a real rate; the inflation expectation needs to be removed from the reported market rate. A real discount rate is the difference between the nominal interest rate and the assumed inflation rate. It is recommended that where adjustments are necessary to eliminate the inflation assumptions from observed market rates, the BLM should consider using an established source such as OMB's inflation assumptions found in Circular A-94, Appendix C. For example, the inflation rate used by OMB in Appendix C (January 2003) is 1.9 percent per year.

Fees and Taxes – Trust account management fees and income taxes potentially reduce the return on an investment. Any funding mechanism required under 43 CFR 3809.552(c) must be self sustaining, including an approach to allow for the payment of these costs from the fund. One way to account for these costs is to adjust the discount rate to reflect these costs.

To account for a trust account management fee that is stated as a percentage of the account balance, the rate of the applicable annual management fee should be subtracted from the anticipated return on investment for the account. For example, if the return on investment is projected as 3.9 percent and the management fee is 1 percent of the total annual account balance, then the discount rate should reflect that reduction in the net return, i.e., 2.9 percent (3.9 – 1.0 = 2.9).

To the extent taxes reduce the effective return on investment for funds in the trust fund, they must be accounted for. However, determining the effect of taxes on the return on investment is not as straightforward as it is for the trust account management fees. The type of financial instruments that the funds are invested in will affect what taxes are due. For example, Municipal bonds are generally exempt from Federal, state, and local taxes. U.S. Treasuries are exempt from state taxes, but not Federal taxes. Corporate bonds are subject to both Federal and state taxes.

In assessing the effect of taxes, the rate at which the tax will be applied needs to be considered. One way to address this question is to consider the different market interest rates on tax exempt and non-exempt investment instruments. At the time this guidance was being prepared, the average return on long-term AAA Municipal bonds was about 15 percent lower than those offered for comparable maturity U.S. Treasuries. Since the security, maturity, and state and local tax status for these two instruments are relatively similar, that 15 percent difference reflects the effect of Federal taxes on the return on investment. For example, using a 3.9 percent discount rate and an anticipated trust account management fee of 1 percent, the return on investment in the fund is projected as 2.9 percent. That return is then reduced by 15 percent to account for Federal taxes. Fifteen percent of 2.9 percent is approximately 0.4 percent, resulting in a net return on investment for funds in the account of about 2.5 percent. Note, this calculation was provided only as an example.

Consult with the Solicitor's Office to determine whether the mechanism may be considered to be a non-profit mechanism which would be exempt from Federal income tax.

Determining the Present Value

Present Value Calculation – Once an appropriate discount rate that reflects the net return on investment has been determined, the present value of the future costs can be calculated. Table 2, *Present Value Calculations,* provides an example of how future costs can be discounted to determine their present value. For this example, the anticipated post-reclamation obligations (PRO) run from year 30 through year 42, the hypothetical costs are presented as real (constant-dollar) costs (C), and the discount factor (DF) is based on OMB's (February 2002) 30-year published real interest rate (3.9 percent), less a 1 percent annual trust fund management fee and 0.4 percent for Federal taxes (marginal tax rate of 15 percent). DF is calculated as $1/(1+i)^t$, where "i" is the discount rate (2.5 percent) and "t" is the year. The present value (PV) for each year's costs is the product of those estimated costs and the discount factor.

The present value of the estimated costs for year 30 is calculated as:

$DF=1/(1+i)^t$

$DF=1/(1+0.025)^{30}$

DF=0.4767

PV=C(DF)

PV=$10,000(0.4767)

PV=$4,767

Table 2
Present Value Calculations

Year	Estimated Constant-Dollar Costs	Discount Factor	Present Value Of Costs
30	10,000	0.4767	4,767
31	10,000	0.4651	4,651
32	10,000	0.4538	4,538
33	10,000	0.4427	4,427
34	10,000	0.4319	4,319
35	150,000	0.4214	63,210
36	10,000	0.4111	4,111
37	10,000	0.4011	4,011
38	10,000	0.3913	3,913
39	10,000	0.3817	3,817
40	150,000	0.3724	55,860
41	10,000	0.3633	3,633
42	10,000	0.3545	3,545
Total			164,802

In this example, the operator would need to deposit $164,802 into the trust fund at the beginning of year 1, in order to meet those estimated PRO in years 30 through 42.

In conducting a discount analysis, it is important to keep in mind the uncertainties of the inputs and the sensitivity of the analysis to certain inputs. Specifically, a slight change in the discount rate can significantly change the amount of money the operator will need to commit to the fund. To demonstrate this sensitivity, by using a higher discount rate (3.9 percent versus 2.5 percent) in the example shown in Table 2 above, the operator would need to deposit $100,127, almost 40 percent less.

Period of Analysis – For trust funds or other fund mechanisms that cover PRO over a very long period of time, or even perpetual, determining the appropriate period of the analysis becomes problematic. Mathematically the calculations, similar to that performed in Table 2, can be made for any time period. However, the present value of the cost of any PRO becomes smaller and smaller the further in the future those obligations are expected to occur. For example, the present value of a $10,000 obligation in year 30, using a 2.5 percent real discount rate, is $4,767. If that same obligation is in year 100, the present value is $846. For year 200, that $10,000 obligation has a present value of $72. At some point the calculations of the present value of obligations into the distant future are not very meaningful.

Variability in the inputs, especially in the discount rate, due to uncertainties far outweighs the added value due to extending the calculations. To demonstrate this point, instead of using a 2.5 percent discount rate, a 3.5 percent discount rate is used. For that calculation, the present value of a $10,000 obligation in year 200 is $10. If the discount rate applied is 1.5 percent, the present value for that future obligation is $509.

Unfortunately, there are no economic standards or rules defining when the point is exceeded when additional present value calculations do not contribute in any meaningful way to the ultimate answer. When defining the parameters for the analysis for a particular project, it is recommended that the responsible BLM office consult the BLM state office economist concerning the appropriate time period to be analyzed.

Permanent or Perpetual Fund – Where the costs of meeting the PRO are projected to be reoccurring costs and those costs are expected to continue indefinitely, it may be appropriate to calculate the reoccurring costs based on permanent funding needs. In such a situation, there is an alternative to conduct a discount analysis as described above. A simpler method to estimating the amount of money that will need to be deposited is to divide the estimated average annual real cost (C) by the selected real discount rate (i). For example, if the average cost to cover the operator's PRO is estimated to be $10,000 per year, in constant dollars, and a 3.9 percent real discount rate is used, $256,410 (10,000/0.039) would need to be deposited into the funding mechanism to establish a permanent or perpetual fund. This amount would cover the cost of those annual obligations into perpetuity without ever touching the principle.

$$PV=C/i$$

$$PV=\$10,000/0.039$$

$$PV=\$256,410$$

The example above provides for the annual dispersal of funds to begin at the end of year 1. Instead the annual payments from the fund may not start until sometime in the future, e.g., year 10. In such a case, the fund would not need to be established with the full amount but rather an amount that would grow to $256,410 by year 10. To determine the amount that would need to be deposited the present value will need to be estimated using the discount analysis process. The present value of $256,410 in year 10 is $174,896 using a 3.9 percent discount rate.

$DF=1/(1+i)^t$

$DF=1/(1+0.039)^{10}$

DF=0.6821

PV=C(DF)

PV=$256,410(0.6821)

PV=$174,896

<u>Phased Funding of the Account</u> – Where the district/field manager determines the public's interests are adequately protected, a trust fund or other funding mechanism may be established as an escrow account with the operator depositing funds needed to address the PRO over time. If this escrow approach is used, growth of the fund will accrue from the interest gained and increase in value of the assets <u>plus</u> the additional funds being deposited. As such, a simple present value analysis, as discussed above, cannot be used to determine the amount of money that will need to be deposited when establishing the fund. That analysis needs to be based on the point in time when all deposits have been made.

In the example provided in Table 2 above, if the district/field manager allows the operator to establish the trust fund by depositing the needed funds over a period of time, then $164,802 would not be the initial deposit as suggested by the above present value analysis. For example, the operator is allowed to make equal deposits over a 5-year period in establishing the fund. In effect, year 1 of the present value analysis would actually be year 5 of the operation; the year the trust fund is fully funded. Table 3 – *Phased Funding Calculations* presents this concept.

Table 3
Phased Funding Calculations

Year Of Operation	Year Since Fully Funded	Estimated Constant-Dollar Costs	Discount Factor	Present Value Of Costs
30	25	10,000	0.5394	5,394
31	26	10,000	0.5262	5,262
32	27	10,000	0.5134	5,134
33	28	10,000	0.5009	5,009
34	29	10,000	0.4889	4,889
35	30	150,000	0.4767	71,505
36	31	10,000	0.4651	4,651
37	32	10,000	0.4538	4,538
38	33	10,000	0.4427	4,427
39	34	10,000	0.4319	4,319
40	35	150,000	0.4214	63,210
41	36	10,000	0.4111	4,111
42	37	10,000	0.4011	4,011
Total				186,458

In this example, the operator would need to have $186,458 in the trust fund by year 5 of the operation to ensure adequate funds will be available to meet the estimated PRO.

To determine the required operator deposits for years 1 through 5, a sinking-fund deposit analysis will need to be conducted. This analysis is used to calculate a uniform series of equal end-of-period payments to accumulate the required amount of money by a future year. The sinking-fund deposit factor is calculated as $[i/((1+i)^n-1)]$ where "i" is the discount rate and "n" is the number of years. To solve for the required annual payments (AP), the future value (FV) at the end of year 5 is $186,458 as calculated in Table 3, the discount rate is 2.5 percent and the period of analysis is 5 years.

$$AP=FV[i/((1+i)^n-1)]$$

$$AP=\$186{,}458[0.025/((1+0.025)^5-1)]$$

$$AP=\$35{,}473$$

For this example, the operator will need to deposit $35,473 into the trust fund each year for the first 5 years of operation. The combination of these deposits and an increase in the value of the funds in the account will grow to the desired amount by year 5. From year 5 to when the funds will be needed, the account will continue to grow based on the gain in value of the funds in the account.