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June 7, 2017

Mr. Michael Sliva
Chair – Ohio Reclamation Forfeiture Advisory Board
2045 Morse Road, Building H-3
Columbus, Ohio 43229-6693

Re: Actuarial Analysis of the Ohio Reclamation Forfeiture Fund – June 2017 Report

Dear Chairman Sliva:

Attached is our report documenting our analysis of the financial soundness of Ohio's Reclamation Forfeiture Fund (Fund). This report represents the combined efforts contributed by the Ohio Reclamation Forfeiture Fund Advisory Board, the Ohio Department of Natural Resources – Division of Mineral Resources Management, and Pinnacle Actuarial Resources, Inc.

As we state in our report, we believe the Fund currently meets the criteria for long term solvency to cover expected liabilities and expenses. This is not to say that the current Fund balance is adequate to cover catastrophic events, such as taking on the liabilities resulting from the failure of one of the largest operators in the state, but it can cover the reasonably expected liabilities. Additional details are contained in our report.

It has been a pleasure working with you on this study. Please feel free to contact anyone from the engagement team should you have any questions.

Best regards,

John E Wade

John E. Wade, ACAS, MAAA
Consulting Actuary
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Enclosure

cc: Lanny Erdos, Chief ODNR-DMRM

Analysis of the

RECLAMATION FORFEITURE FUND

Oversight by the

Reclamation Forfeiture Fund Advisory Board

Maintained by the

Ohio Department of Natural Resources

Division of Mineral Resources Management

Issued June 7, 2017

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Purpose

Pinnacle Actuarial Resources, Inc. (Pinnacle) has been retained by the Reclamation Forfeiture Fund Advisory Board of the State of Ohio (the Advisory Board or RFFAB) to review the Reclamation Forfeiture Fund's (Fund's) financial soundness.

Qualification to Provide Actuarial Report

This report is provided to the Advisory Board by John E. Wade, ACAS, MAAA. Mr. Wade is a member in good standing of the American Academy of Actuaries and meets its qualification standards to prepare this report.

Distribution and Use

This report and conclusions contained herein are being provided to the RFFAB for its use in connection with our actuarial analysis of the current and estimated future Fund's liability in comparison with the current and estimated future assets. This report has been prepared to support the Advisory Board in complying with the Ohio legislation which established the Advisory Board as the oversight organization with respect to the Fund. The legislation also required a report be made to the Governor of the State of Ohio by the Advisory Board on a biennial basis.

We understand that copies of this report may be provided to the state auditors and other regulatory authorities along with other parties in compliance with Ohio's open records policies. Permission is hereby granted for this distribution on the condition that the entire report, including all exhibits, is distributed rather than any excerpt. These third parties should recognize that the furnishing of this report is not a substitute for their own due diligence and should place no reliance on this report or the data contained herein that would result in the creation of any duty or liability by Pinnacle to the third party.

The attached exhibits in support of our findings are an integral part of this report. These sections have been prepared so they document our actuarial assumptions and judgments. Judgments about the conclusions drawn in this report should be made only after considering the report in its entirety. We remain available to answer any questions that may arise regarding this report. We assume that the user of this report will seek such explanation on any matter in question.

Our conclusions are predicated on a number of assumptions as to future conditions and events. Those assumptions, which are documented in subsequent sections of this report, must be understood in

order to place our conclusions in their appropriate context. In addition, our work is subject to inherent limitations, which are also further outlined and discussed later in this report.

Reliances and Limitations

We have prepared this report in conformity with its intended use by persons technically competent in the areas addressed and for the stated purposes only.

We have relied upon data and information supplied by members of the Ohio Department of Natural Resources – Division of Mineral Resources Management (ODNR-DMRM) staff including Permitting & Bonding, Forfeiture and AML, Regulatory and Data Management.

There is a limitation upon the accuracy of these estimates in that there is an inherent uncertainty in any actuarial estimate of future costs. This uncertainty is due to the fact that the ultimate liability for claims is subject to the outcome of events yet to occur, e.g., the likelihood of permit holders running into financial difficulty and default, the size and cost of reclamation, changes in the standards of reclamation and desired speed of reclamation. While there are no standard techniques for which to develop estimates for these specific issues, in our judgment, we have employed techniques and assumptions that are appropriate and the conclusions presented herein are reasonable, given the information currently available. However, it should be recognized that future loss emergence will likely deviate, perhaps materially, from our estimates.

We have relied on the data provided without independent audit or verification on the part of Pinnacle to develop our estimates of potential future reclamation cost. We also worked with the ODNR-DMRM staff to understand the operation of the Fund, the reclamation process and the underlying data provided but only to the extent such information may have affected our analysis. While we have not anticipated any extraordinary changes to the economic, legal, or social environment which might affect the cost and frequency of default, we have recognized the current state of the Ohio coal mining industry in selecting our near term forfeiture rates, relying on the RFFAB's judgement of the impact of current economic conditions.

Our estimates are provided net of underlying performance security (also known as performance bonds or bonds). We have made no attempt to evaluate the quality of security provided. Should such providers be unable to fulfill their obligations, the Fund would be responsible for this additional reclamation cost.

We estimate nominal costs at an expected level (50% likely that actual costs will be below our estimate and 50% likely they will be above), then apply inflationary factors, and finally discount to present values using investment rates derived from the US Treasury, recent returns of the Fund, and discussions with the RFFAB. Discounting is reliant upon the investment rate and timing of payments, both of which are assumptions in this model and are subject to potentially high variability. Looking at future payments on a discounted basis could unintentionally remove a level of conservatism not intended by the RFFAB. For financial statement purposes, the Fund's liabilities might be better stated on an undiscounted basis. Exhibits 2.2 and 2.3 show the claims liabilities for land reclamation and water treatment before the impact of cost inflation and discounting (Columns 1 and 4), after the impact of cost inflation but before discounting (Columns 2 and 5), and after both cost inflation and discounting (Columns 3 and 6). The difference is most profound on the water treatment liability, where a 75 year payout is assumed.

Please note that for the purposes of this report, the Performance Security Estimate (PSE) and Central Tracking System (CTS) data was provided as of February 27, 2017.

Further reliances and limitations are contained in the subsequent text, and in the exhibits accompanying the text.

Executive Summary

There are several ways to view financial soundness. We find that the Fund is solvent on a short term basis as the current Fund assets ($25.9 million) exceed the current Fund outstanding liabilities and obligations for forfeited reclamation projects ($5.8 million). For longer-term solvency, the measurement compares the current available Fund assets with the Fund's long term expected exposure or liability ($25.1 million on a present value basis of expected land reclamation and long-term water treatment costs of current permits plus the administrative expense to settle the liabilities). We believe the Fund currently meets the criteria for long term solvency to cover expected liabilities and expenses. This is not to say that the current Fund balance is adequate to cover catastrophic events as described in the next paragraph. This is an improvement over our 2015 actuarial analysis wherein we estimated that it would take seven more years of no forfeiture costs before the Fund could accumulate enough surplus to cover expected liabilities and expenses. The primary driver of this improved forecast is a more optimistic selection of the future forfeiture rates of permits, discussed in greater detail later in this report.

Another indicator of financial soundness is the Fund's ability to withstand a shock loss. It would take two more years of non-forfeitures before the Fund could cover an average loss and nine more years to cover the forfeited permits of the failure of the fifth largest permit holder. The 2015 analysis resulted in projected Fund balances that would cover the failure of either an average loss or the failure of the fifth largest permit holder. These increased time periods are primarily a function of increased average potential liabilities due solely to a decreasing number of permits while overall potential liability remained basically unchanged. If the largest permit holder fails, the fund would need over 150 years of non-forfeitures in order to cover the loss. See Exhibit 1 for additional details.

To further describe the situation, if the Ohio law was changed somehow closing the Fund at this time to any new permits, the future expected revenues from the severance tax from the operating permits currently covered by the Fund for future forfeiture potential plus the current Fund balance would appear to provide sufficient capital to finance the estimated reclamation cost from the long term expected forfeiture of some of the 168 permits included in the Fund today. However, an average shock loss today, on top of the expected forfeitures, would move the Fund into a negative cash flow position within thirteen years. Our long term solvency measure is intended to compare the current balance with the exposures currently in place in a fashion similar to the method used to judge the solvency of insurance or bonding companies.

As with the prior study, through the efforts of the engineers with the ODNR-DMRM, we have developed an estimate of the total potential cost to reclaim all of the subject mining operations

covered by the Fund. This effort had historically only been undertaken once a site had been forfeited. In general, we note that underlying performance security provided through the private insurer/bonding community reduces the potential liability of the Fund.

Thus, the total potential cost to the Fund equals the total potential cost for all reclamation efforts less the underlying performance security. This potential Fund figure should be viewed as the maximum possible cost or the worst case scenario (although should a provider of the performance security also default, the Fund would also be obligated for the reclamation cost covered by that provider).

The Fund is involved in assuming financial risk for an exposure that is categorized as low frequency of claims but very high severity in dollar terms, when an event (default) does occur. There are currently 25 mining companies with coal mine related permits in the state of Ohio covered by the Fund and included in our study. Some of the operators have only a single permit while other larger operators have a dozen or more mining permits. The operator with the most coal mining permits in Ohio currently has 63 permits in the Fund.

The small number of operators and the tremendous potential liability from a few of the larger operators create a significant risk to the Fund from a concentration of risk perspective. For example, should one of the permit holders with only a single coal mining permit become financially unable to meet their reclamation obligations, the cost to the Fund might fall anywhere from no cost (liability covered through bonding) to almost $4 million. See Exhibit 7.1a. With the current Fund balance, the reclamation cost of a forfeiture of a single permit holder can be financed.

On the other side of the spectrum, should one of the permit holders with a large number of sites become financially troubled, the cost to the Fund for reclamation could easily exceed $35 million, with the largest potentially exceeding $206 million. See Exhibit 7.1b.

Our analysis includes the development of the Expected Cost to the Fund. We define the expected cost as the long run average that considers both the potential of a permit holder's forfeiture along with the potential cost of that forfeiture. If the Fund was collecting a single "premium" from the operators at the start of each project for providing this financial security as do insurance and bonding companies, this Expected Cost (along with any operating expenses) would be the basis for the "premium" required from each site and operator.

With this analysis, we have developed estimates based upon an annual forfeiture rate of 0.50%, as developed in Exhibit 5.2. Our method of estimating expected ultimate loss applies the selected forfeiture rates to every permit every year to determine an average expected loss.

The forfeiture rate selection is based upon historical Ohio forfeiture information and forfeiture rates developed by using Kentucky and West Virginia information. Applying the same procedure as the 2015 analysis, Ohio's data received 60% weight in the selection, and the other states combined received 40% weight. The selection also considered the current economic and operational state of the Ohio coal mining industry as gleaned by discussions with the RFFAB.

To say it another way, with our recent analyses the forfeiture rate selection is heavily driven by actual historic Ohio forfeiture experience which was omitted from both our 2009 and 2011 studies. The previous omissions were intentional because the recent years of no forfeiture activity was not thought to be very credible. While it would not be prudent to assume that the future forfeiture rates over the long term would remain as low as they have been in recent years, the stability of the program should be recognized, hence the application of the 60% weight to Ohio's long term average forfeiture rate.

New to the 2017 actuarial analysis is a range of land reclamation cost estimates. Pinnacle has developed a low estimate and a high estimate based on adjusting the forfeiture rate. For the low estimate, the forfeiture rate is based on a 75% weight to Ohio and a 12.5% weight to both Kentucky and West Virginia. The result is a low scenario forfeiture rate equaling 0.33%. The high estimate is based on a 45% Ohio weighting and a 27.5% weighting to Kentucky and West Virginia. This weighting results in a high scenario forfeiture rate of 0.67%. These low and high forfeiture rates are applied to the land reclamation cost calculations to produce a range. See Appendices A and B which include the development of the low and high forfeiture rates, respectively.

We include a direct reflection of reclamation cost inflation and discounted the future liabilities to present value using interest rates based on recent US Treasury information. The cash flow tables in Exhibit 1 are presented on a discounted to present value basis.

Based on our analyses, we have developed a net land reclamation Fund Expected Cost estimate for the permits currently included in the Fund of $22.8 million in Exhibit 2.2. This estimate compares to our range estimates of $17.1 million on the low end and $28.5 million on the high end. See Appendices A and B which include the summary of the land reclamation expenditures under the low and high forfeiture rates, respectively.

Also, we have developed a long-term water treatment Fund Expected Cost estimate for existing permits of $0.7 million in Exhibit 2.3.

In Exhibit 1, Cash Flow, we display the expected revenues that will cover the above costs. Tonnage fees from the permits associated with the above costs are expected to accumulate to $9.9 million over the next 75 years (the projected time period to work through the long-term water treatment liabilities). During that same time, interest income earned on the positive fund balance would be expected to accumulate to $21.9 million. This report does not study the potential of new permits, either for income or for costs.

In order to cover the expected costs for land reclamation and long-term water treatment of the current permits, the Fund should have an approximate $25.1 million balance ($22.8 million for land plus $0.7 million for water plus $1.6 million for operating expense). This can be thought of as the funding level to be 50% confident that the funds will adequately cover expected costs, that is, half the time this level of funding would be adequate, and half the time it would be insufficient. It is reliant on the assumptions explained throughout this report.

We have incorporated a shock loss scenario that examines how the forfeiture of an average-sized permit holder would affect the Fund: resulting in an estimated $25.7 million in additional liability to the Fund. See the derivation in Exhibit 7.1b and the cash flow play-out in Exhibit 1 - Shock Loss. For practical considerations, the cash flow exhibit incorporates a $3.5 million cap on land reclamation costs per year. This spreads the shock loss out over a twelve year period. It is unlikely that the activities required to reclaim the land associated with the hypothetical shock loss could be performed in a shorter time period.

To adequately cover the expected cost of the current permits and the shock loss of an average-sized permit, the Fund would need to build to a balance of $50.8 million ($22.8 million for land plus $0.7 million for water plus $1.6 million for operating expense plus $25.7 million). It is informative to note in Exhibit 1 – Shock Loss that even a shock loss as described above with reclamation costs beginning in 2020 would move the Fund to a negative balance in 2029. Given the current economy and the financial condition of some of the coal operators in Ohio, the RFFAB should consider to what extent it wants to fund for a shock loss, whether it be an average loss or one far greater as displayed in Exhibit 7.1b.

Please note that the current analysis and immediate prior analysis considered the possibility that a permit in danger of forfeiture could be taken over by another more financially secure operator, who would potentially assume the previous permit holder's assets, mining rights and reclamation responsibilities. This replacement action eliminates the reclamation cost to the Fund, potentially saving millions of dollars for the Fund. By using Ohio's historic forfeiture experience, we account for that activity to the extent it has occurred in the past, including the recent activity for Valley Mining.

There are advantages that insurers have that are not available to the Fund. The most obvious advantages include:

- The spread of risk across insureds, locations, industries and lines of business;
- The ability to individually underwrite and price each risk; and, maybe most importantly,
- A level of surplus (available capital) in addition to the collected premium which allows an insurer to survive years and periods where the actual costs exceed (and sometimes greatly so) the expected long run costs. When actual annual costs exceed long-term expected annual costs, the insurers have this operating capital. In contrast, the Fund until recently had been using recent proceeds to pay for the current reclamation projects. The Fund has now begun and continues the capital accumulation process.

Summary of Findings

Based upon the methodology and assumptions described above, we have estimated the present value of potential expected liability of the Fund as follows:

Liability	Net Present Value Expenditures
Land Reclamation	$22,815,272
Water Treatment	701,843
Administrative Expense	1,590,000
Total	$25,107,115

The above calculations are found in Exhibit 2.1. This compares to our 2015 total estimate of $36.3 million, and our 2013 total estimate of $18.9 million.

There can be considerable variation around this estimate due to:

- The limited number of coal operators within the state of Ohio,
- The uncertainty with respect to future forfeiture rates,
- The emergence of water treatment liability,
- The number of operators with multiple permits,
- The relationship of the performance security provided by the private insurance market and estimated cost to reclaim the various sites along with the large size of some of the operators.

For example, should one of the largest operators be unable to meet its obligations, the potential cost to the Fund from a single operator could approach $206.2 million. An additional $25.7 million would be needed to cover an “average” shock loss. Please see Exhibit 7.1b.

In actuarial and insurance regulatory language, the Fund has significant risk of material adverse deviation from the estimated expected loss. This risk can easily be seen in two contexts. The first would be in comparing the largest single potential cost with the average potential cost. On an operator basis, this is $206.2 million versus $25.7 million, or a relationship of 8 to 1. Please see Exhibit 7.1b. The second context would be a comparison of the largest single potential loss with the current

available capital in the Fund, or $206.2 million to $25.9 million (as of January 2017), again a ratio of 8 to 1. Even the average potential cost of $25.7 million nearly exceeds the Fund's current capital of $25.9 million after reduction for the Valley Mining losses.

Pinnacle has calculated a range of cost estimates in order to account for the variation around our estimate. As previously mentioned, the range is based on adjusting the selected forfeiture rate of 0.50%. The table below displays the results.

	Net Present Value Expenditures		
Liability	Low Estimate (0.33% forfeiture rate)	Current Estimate (0.50% forfeiture rate)	High Estimate (0.67% forfeiture rate)
Land Reclamation	$17,117,483	$22,815,272	$28,513,061
Water Treatment	701,843	701,843	701,843
Administrative Expense	1,590,000	1,590,000	1,590,000
Total	$19,409,326	$25,107,115	$30,804,904

Our range of estimates only affects the land reclamation expenditures. The water treatment and administrative expenses do not vary by scenario.

The establishment of the forfeiture rate is an exercise involving several assumptions and financial judgments. The benefit is a reasonable range of outcomes to consider when making financial decisions. While we believe the above range is reasonable, it should not be interpreted to incorporate all possible outcomes. (To consider all possible outcomes would result in a range from no more forfeitures at the low end, to 100% forfeitures at the high end.)

Ohio Reclamation Forfeiture Fund Background

The current Fund was significantly revised in 2007 by the State Legislature to provide reclamation coverage to eligible coal mine operators permitted by the State of Ohio in addition to the required private performance security for each site. This coverage is designed to step in to provide for funding the reclamation costs of coal mining sites in the event of financial default of the permit holder. The mechanisms prior to House Bill 443 in 2007 had not accumulated a significant amount of capital or revenue for its operations but the Bill did assign the responsibility for the on-going cost associated with the prior operator defaults not yet fully reclaimed to the Fund. Fortunately, there have been no new forfeitures requiring Fund financial support from year-end 2006 through year-end 2013. (There were 6 forfeitures from Valley Mining in 2014.) As of the end of January 2011, there were no permits/sites on the list to be reclaimed under the direction of the Fund through the efforts and oversight of the ODNR-DMRM. All reclamation work on permits forfeited prior to 2006 was substantially completed by year-end 2010.

The coal mine permit holders must maintain performance security (bonding) coverage in the amount of $2,500 per acre of land based upon the acreage designated to be affected in the given year as allowed on the permit. The performance security can be obtained from the private insurance market or financed by some other means such as letters of credit, certificates of deposit, cash or trust agreements.

The Fund provides additional forfeiture coverage for reclamation efforts on underground mines, surface mines and facility permits. Facility permits might include operations such as preparation plants, coarse refuse and slurry areas. The eligible mine operators who select to be reliant on the Fund for costs above the performance security pay a severance tax (i.e., tonnage fee) to the Fund which varies from $0.12 to $0.16 per ton of coal extracted based upon the Fund's balance. The required amount of private performance security is based upon the affected acreage on each permit issued by the ODNR-DMRM. Many operators have submitted permit applications with a significant amount of land not currently affected by mining. The extra acreage has been included within the permit and performance security up front to eliminate the need for the operator to reapply or post additional performance security each time mining operations commence on another parcel of land. Also, some eligible operations, by choice or requirement, are fully covered by private performance security and not part of the "pool" operated by the Fund.

The total potential reclamation cost estimate is based upon the ODNR-DMRM engineer's assessment of the approved mining and reclamation plan on each permit including any on-site processing facilities covered by the Fund. This cost estimate is commonly referred to as the PSE. Each PSE uses unit costs

derived from the historical reclamation costs on Abandoned Mine Land projects, cost data from R.S. Means and yearly direct inquiries for quotes. These unit costs are applied to the approved mining and reclamation plans to assess the total potential cost in the event of forfeiture. Prior to our 2009 analysis, this PSE information had not been routinely established at the beginning of each permit operation nor reviewed annually to assess the potential cost to the Fund. It should be noted that the forfeiture coverage is now updated periodically by the ODNR-DMRM during the active mining operation period of the mine and also during the reclamation process until the permit is released by the ODNR-DMRM.

Recently, the Advisory Board became concerned that PSEs were too conservative and did not portray an accurate representation of the total liability of permits in the Fund. In 2016, a workgroup was established to develop procedures to calculate accurate cost estimates based on field conditions. This group consisted of individuals from Permitting, Inspection, AML, and Industry. As a result, a more advanced PSE procedure was implemented to provide a more precise estimate of Ohio's cost of the disturbed land in the event of a permit forfeiture.

The amount of the required performance security on a permit is adjusted during the reclamation process based upon the acreage affected. The amount of the private performance security required on any given affected acre is decreased by 50 percent upon satisfactory completion of the procedure to backfill and re-grade the land (phase 1 of reclamation). Another 35 percent decrease in required performance security is made when the land is re-planted and re-growth or re-vegetation has been satisfactorily completed in accordance with the requirements set forth in the Ohio Revised Code and Ohio Administrative Code (law and rule) (phase 2 of reclamation). The final 15 percent of the required performance security amount is typically released in about seven years following the date of planting, if no additional action was necessary by the operator to achieve satisfactory reclamation. It should be noted that the private performance security is not related to the estimated reclamation cost but rather a fixed amount of coverage ($2,500) per acre affected. As noted previously, at any site, the operator may elect not to rely upon the financial support of the Fund and choose to provide complete private performance security in the full amount of the estimated reclamation cost (using the same estimation methodology and unit cost values as the permits which are eligible and choose to rely upon the Fund).

In the case of default by the operator, the private bonding company may elect to reclaim all or a portion of the site based upon the amount of performance security remaining as surety bond. The remainder of the site reclamation effort would be turned over to the Fund possibly with the performance security payment of up to $2,500 per acre depending upon the amount previously released. Each coal mine operator may have multiple active sites (permits) with affected acres at

various phases at any time. This situation with multiple permits from a single operator results in additional concentration of risk.

As of February 27th, 2017, there were 100 active permits for coal mining operations in Ohio that were part of the Reclamation Forfeiture Fund "Pool". There were also 68 permits covered by the Fund with no future mining activity planned that had "Final Maps" accepted by the ODNR-DMRM. See Exhibit 7.6a. Final Maps reflect the cumulative affected area on mining operations and are used to determine an accurate reclamation cost estimate on each permit following completion of mining.

From the data provided for this analysis, we had ODNR-DMRM engineer's performance security estimates on all 168 Fund-covered permits from 25 different operators. Of the 168 permits with PSEs, the current PSEs for 133 permits are greater than the possible funding from bonding, letters of credits, deposits or other instruments (private performance security). Please see Exhibit 7.2. The operator counts have been adjusted to reflect the fact that some permit holders are part of one umbrella company structure. This issue is noted due to the impact that organizational structure has upon the concentration of risk. If a multiple permit holding operator should run into such financial difficulty that it defaults, we have assumed that all permits under that umbrella corporation are impacted and default as well.

Changes in the Data since Previous Report

We have compared the Performance Security Estimates for the 157 permits which had Performance Security Estimates in the data included in the previous report as well as Performance Security Estimates in the current data provided by the engineers from the Ohio Department of Natural Resources. Of these permits, the PSEs on all permits changed. For 102 permits, the PSEs in this year's data were lower than the PSEs included in the previous data by a total of $236.3 million of potential reclamation cost. For the remaining 55 permits, the performance security estimates increased by a total of $216.8 million since the data for the last review was collected. The overall net change is a decrease in the Performance Security Estimate or the anticipated cost of reclamation of $19.5 million, an improvement brought on as part of the ODNR-DMRM's effort in refining their PSE estimates. Please see the bottom of Exhibit 7.6a.

As should be expected, a grand majority of the permits in the database are from surface mining operations. Of the 168 permits included with PSEs, only 15 permits are related to underground mining operations and another 20 permits are related to facility permits. Please see Exhibits 7.3a, 7.4a, and 7.5a.

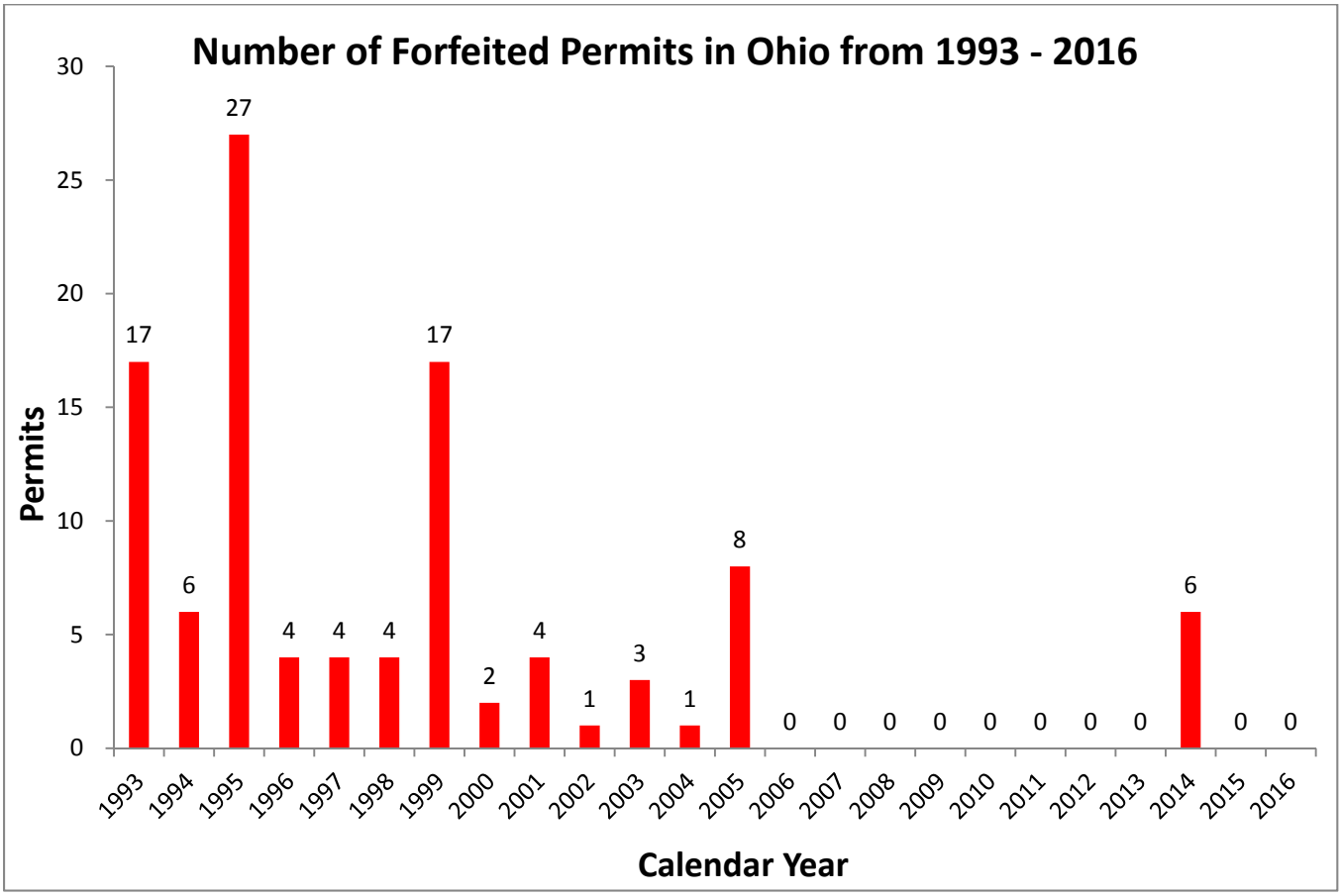
Of the 100 active permits, we have PSE data for 72 surface mining operations, 10 active permits for underground mining operations and 18 operating facilities permits. Please see Exhibits 7.3a through 7.6a. We note that the preceding information reflects only those permits covered by the Fund and not those that have elected or are required to operate under full private performance security.

Historical Forfeitures

As background information, the ODNR-DMRM provided the historical forfeiture order information available from the US Department of the Interior's Office of Surface Mining (OSM) covering the past 24 years by the year in which the order was made. Since 1993, there have been a total of 104 bond forfeiture orders to 33 permit holders. This results in an average of 3 permits per permit holder. The actual number of forfeiture orders per permit holder has ranged from 1 to 21 permits.

From years 2000 through 2013, there had been only 19 forfeiture orders. Seven of these forfeiture orders in year 2005 were terminated because the company was able to reclaim and continue operation on the affected sites. These forfeiture orders did not result in any dollars being requested from the Fund to assist with the reclamation process. Even more impressive, there have been no forfeiture orders from years 2006 through 2013. Unfortunately, in October of 2014, permit holder Valley Mining incurred 6 forfeitures. However, even considering this, the lack of recent forfeitures otherwise has allowed the Fund to cover the reclamation costs of previously forfeited locations including those forfeited prior to House Bill 443.

More importantly, the Fund has begun accumulating capital to cover potential future forfeitures of currently covered permits. In the early 2000s before House Bill 443, this capital accumulation process had been further slowed by the insolvency of a performance security provider (bond insurer) for two of the permit holders, one of which was an operator with a significant number of permits.



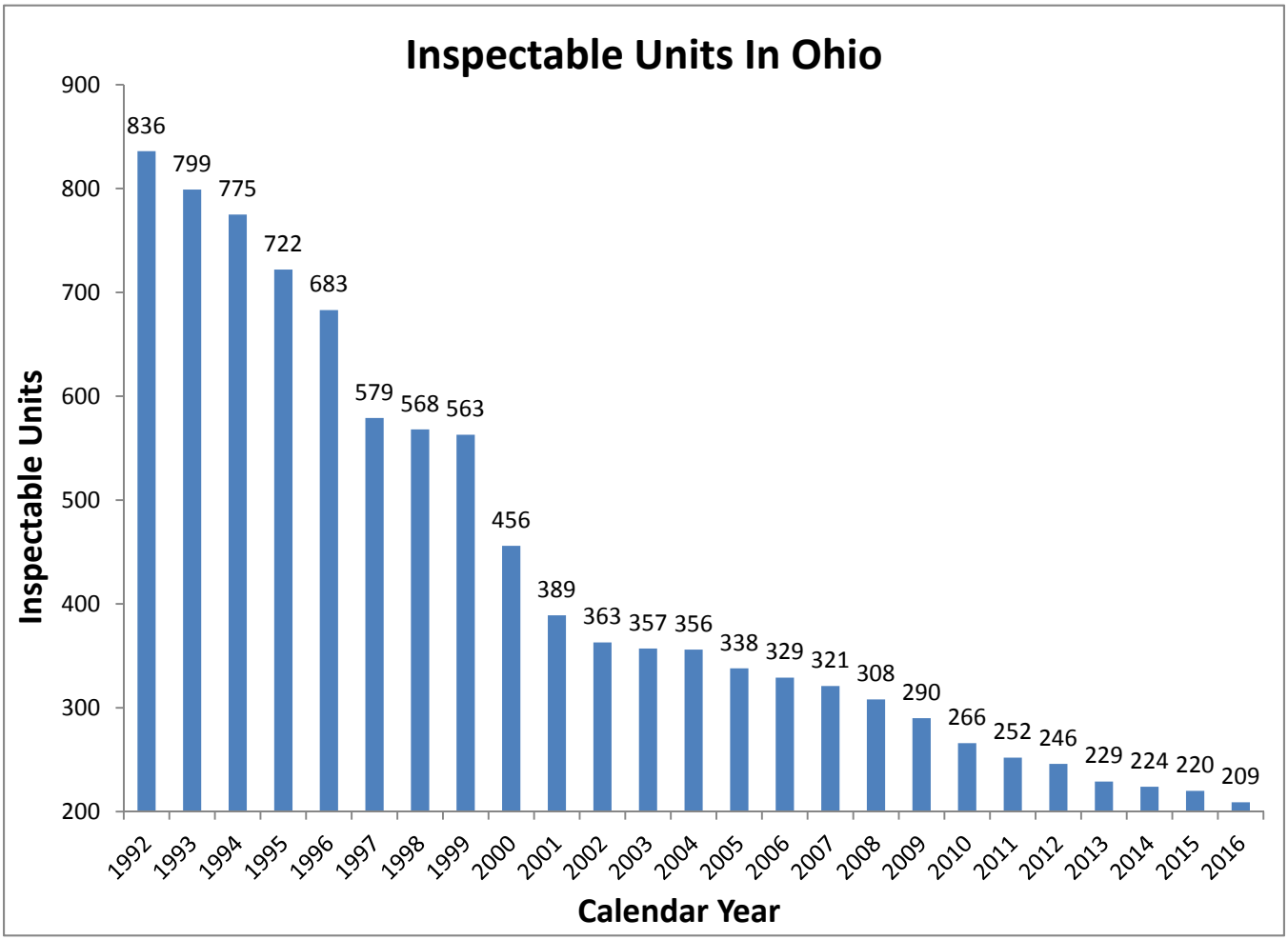
Source, Ohio Department of Natural Resources, Division of Mineral Resources Management

We noted in the previous analysis that similar to states that experience hurricanes, the lack of forfeitures in the recent past prior to year 2014 does not provide support for an assumption that there will be no forfeiture events in the future. In 2014 this assertion was proven true when the Fund experienced 6 forfeitures in October of that year.

The average annual number of forfeiture orders over the twenty four year available period has been about 4.3. We note that from 2000 to 2013, the annual permit forfeiture order frequency had declined to 1.4 permits per year. And most notably, from 2006 to 2013 there were no forfeitures. However, the good fortune ended in year 2014 when 6 permits were forfeited. We also note that although there were official forfeiture orders made on eight permits during calendar year 2005, the Fund was only called upon to provide reclamation capital on one of these sites – a very positive development for the Fund's financial situation. We were also provided with forfeiture information as compiled by the ODNR-DMRM which showed forfeiture activity during 1989 to 1992 at roughly the same levels as the 1993 to 1995 period.

If we measure the annual number of forfeitures at the Permit Holder level rather than the permit level, the long term permit holder forfeiture frequency has been less than two operators per year.

The number of inspectable units (permitted mining operations) in Ohio over the 25 year period is displayed in the chart below. Over the period of time 1992 through 2016, there have been anywhere from 836 to 209 inspectable units in Ohio. These figures are provided by the Office of Surface Mining from their publicly available records.



Source: Office of Surface Mining reports

The average forfeiture rate per number of permits issued is 1.06%. This translates to an annual forfeiture rate of 0.06% based on an average lifetime of a permit of 21 years and adjusting for the fact

that forfeitures rarely occur in the first two years of a permit's active life. Please see Exhibit 5.2. Note that the calculation of forfeiture frequency considers the seven 2005 permits discussed above that were eventually terminated. Since our goal is to estimate future frequency rates, it is prudent to realize that future remediation efforts leading to terminated forfeiture orders may not be as successful.

Comparing Ohio's historic 0.06% forfeiture rate to the Kentucky and West Virginia forfeiture rates of 0.99% and 1.08%, respectively, Pinnacle has selected a projected Ohio annual forfeiture rate of 0.50%. This selection is based on a weighting of 60% to Ohio's forfeiture rate of 0.06%, and a 20% weighting each to Kentucky's forfeiture rate of 0.99% and West Virginia's forfeiture rate of 1.08%.

The selection of the forfeiture rate of 0.50% reflects the inclusion of a mine status forfeiture rate adjustment factor (Exhibit 5.3). While we do not have historical data to determine the forfeiture rate adjustment factors, our selections are intuitively logical. We have also adjusted the final selected forfeiture rate to account for the impact created by the adjustment factors, rendering the overall impact revenue neutral.

Analysis Overview and General Comments

For the current permits covered by the Fund, we have utilized the site specific current estimates of the total *potential* cost to reclaim all of the subject mining operations (Performance Security Estimate or PSE) from the engineers with the Ohio Department of Natural Resources– Division of Mineral Resources Management (ODNR-DMRM). We have combined the PSEs with estimated probability of forfeiture over the lifetime of the permit to develop an estimate of the total expected (or long term average) costs for the Fund.

The engineering estimation effort is now being undertaken by the ODNR-DMRM on a regular basis. At the same time, the new task force has developed a more accurate PSE procedure. This increased frequency of PSE updates greatly facilitates the monitoring of potential cost at the sites and the future analyses of the Fund's potential liability. These more accurate cost estimates generally produce results that are not as conservative as those provided to Pinnacle in prior years. Their impact has been brought directly into our estimation process.

Since the PSEs include all portions of the permit within a single figure, they are adjusted during our analysis to reflect the reported site operating status with respect to the various stages of mining and reclamation. A single permit may have various acres in process of achieving phase 1 release (all activity

including active mining operations prior to completion of all land replacement), in the process of achieving phase 2 release (replanting and reforestation activity) and in the process of achieving phase 3 and final permit release (the waiting period prior to permit release).

In development of our estimation, we reflect that if a permit is forfeited, the underlying performance security provided through the private insurer/bonding community, letter of credit or other security provided would reduce the potential liability of the Reclamation Forfeiture Fund. Thus, the total potential cost to the Fund equals the total potential cost for all reclamation (PSE) less the underlying performance security (bond, etc.). This Fund potential cost figure should be viewed as the maximum possible cost or the worst case scenario, with one exception. In full disclosure of that one exception, we do note that should a provider of the performance security also default, the Fund would be obligated for the reclamation cost assumed to be covered by that provider.

Potential Fund Liability

Our analysis begins with estimates of total land reclamation cost (PSEs) for the 168 Fund-covered permits. In total, the engineer estimated reclamation cost is $584.9 million. This value is reduced by $45.1 million of available and required performance security. These adjustments to the initial PSEs result in a total *Potential Fund Liability* of $539.9 million for land reclamation. Again, these total potential cost figures should be considered a worst case scenario - if each and every operator would forfeit all their permits and no providers of performance security default.

Expected Fund Cost

The combination of the potential cost (adjusted PSEs) and probability that the Fund will be called upon (forfeiture rates) determines the *Expected* Cost to the Fund. This Expected Cost being a combination of the possible cost and the long run probability of default or forfeiture over the life of the permit could be considered the long run average cost of future forfeitures to the Fund. If the Fund was collecting a single up-front “premium” from the operators to provide this financial security in a manner similar to insurance and bonding companies, this Expected Cost (along with any operating expenses) would be the basis for the “premium” required from each site and operator.

We also note that while these are long term average projections, the actual results in any one year or series of years will vary, sometimes significantly, from the long run average. This is the nature of a low frequency/high severity risk such as this. For a similar example, we cite the cost of hurricane losses in a southern state. In some years, there will be no losses due to hurricane while in other years there will be significant losses. Most years are either well below or well above the long term average. The key is

to generate sufficient capital in the less than average years to be available to cover the costs in the years where the costs far exceed the long term averages.

Forfeiture rates

For our 2011 analysis, we obtained publically available financial information about some of the firms holding Ohio coal mining permits through sources such as Standard & Poor's and Dun and Bradstreet. This potential default information was used to estimate the probability of an operator encountering financial difficulties such that the Fund would be called upon to assume the cost of the reclamation projects for each site of the firm.

Later we developed two additional estimates by using the probability of forfeiture estimates by permit type and permit issuance year from the West Virginia Special Reclamation Fund analysis.

For both this analysis and the previous analysis, we developed a forfeiture rate based on historic Ohio experience. We blended that with projected forfeiture rates in West Virginia and Kentucky (using a 60/20/20 weighting). We determined that this measure was superior to the financial ratings as it should be directly related to the Reclamation Forfeiture Fund expected cost. The recent history of no forfeitures was fortunate, but it would not have been appropriate to assume the future long term forfeiture rate would also be zero, as proven in October 2014 when the Fund experienced 6 forfeitures. Hence, we use the long term historic average and include the surrounding state information to add stability and credibility to our method.

This is a major change from our 2015 analysis. In that prior analysis we started with a weighting of Ohio, Kentucky and West Virginia of 75%, 12.5%, and 12.5% respectively. However, because of the worsening financial condition of the industry it was determined that we use a forfeiture rate of 1.0% for the first five years of our projections, and 0.37% thereafter. The financial outlook for the coal industry now appears to be stabilizing, hence the lowering of the forfeiture rate and the establishment of a range of forfeiture rates. Consideration is still being given to the forfeiture experience of neighboring states, particularly in light of the fact that events occurring for those states can also have an impact on Ohio.

We maintain the enhancements incorporated in our prior analyses, which are:

- An adjustment factor to the forfeiture rates to reflect mine status (active, final map, pending phase 1 release, pending phase 2 release, pending phase 3 release)
- Expanded release rates determined from historic data

- An estimated liability for long-term water treatment or long-term alternative water supply (Water)

Based on a number of estimates and assumptions, described later in this report, along with the PSE information from the permits in the Fund, we have developed an estimated land reclamation expected cost of $22.8 million, reflecting inflationary trends and discounting to present value, both explained later in this report. See Exhibit 2.2. This compares to our estimate in the 2015 analysis of $30.4 million.

Water

Effective September 30, 2011 House Bill 163 amended the Ohio Revised Code to account for long-term water treatment and long-term alternative water supplies. In the prior statute, long term water treatment was excluded from coverage by the Fund. House Bill 163 allowed the fund to cover long-term water treatment for those permittees that are reliant on the Fund. It included a provision to allow eligible operators to fund the long term water treatment trust or alternative financial security (AFS) over a 5-year period and the Fund would be responsible to cover the unfunded portion until such time as the AFS was fully-funded (not to exceed 5 years). As discussed later in this report, we have estimated a liability of $0.7 million to account for long-term water exposure on current permits. See Exhibit 2.3.

Shock Loss

Another financial measure of the soundness of the Fund would be its ability to absorb a shock loss without threatening the viability of the Fund. A shock loss for purposes of this study could be considered to be the largest operator, carrying the largest liability, forfeiting all its permits. In this case, an additional $206.2 million in estimated liability would come against the Fund.

In conversations between the RFFAB and coal producers it has been postulated that four of the largest operators would be less likely to be involved in a failure. However, there was some concern expressed about the financial difficulties facing large (and small) operators. For purposes of this study we considered the impact of a shock loss that was equal to the average liability for all operators in Ohio who are reliant on the Fund. See Exhibit 1 – Alternative. That amounted to an additional $25.7 million of estimated liabilities for an “average” shock loss. For comparison purposes, this is approximately $10.0 million lower than the estimate of the cost for the fifth largest carrier defaulting. See Exhibit 7.1b.

While shock losses are highly unlikely to occur because of the financial strength and attractive value of the assets of the larger operating companies, it is prudent to be aware that remote possibilities do exist.

Actuarial Analysis

As described briefly above, the objective of our analysis is to measure the Expected Cost to the Fund of the current operating mines and all facilities currently in various phases of reclamation.

Data

The ODNR-DMRM has provided the following information by permit in an Excel spreadsheet format:

1. The Performance Security Estimate, which is the ODNR-DMRM engineer's assessment of the cost to reclaim the site based upon the approved mining and reclamation plan (described more fully later in this report) for all 168 mining permits covered by the Fund.
2. The performance security on-hand in total for each site along with the amounts separated into the three phases of the reclamation process (also described more fully in a later portion of the report).
3. The distribution of acres on the permitted site between the three phases of operation.
4. The Operator name by permit.
5. The provider of the performance security by permit.

Performance Security Estimate Groupings

The 168 PSEs are provided by the ODNR-DMRM engineers in the following two categories:

A. 68 Permits that have an approved Final Map and coal extraction is completed
B. 100 Permits still extracting coal and thus do not have an approved Final Map

Performance Security (Bond) from Insurers

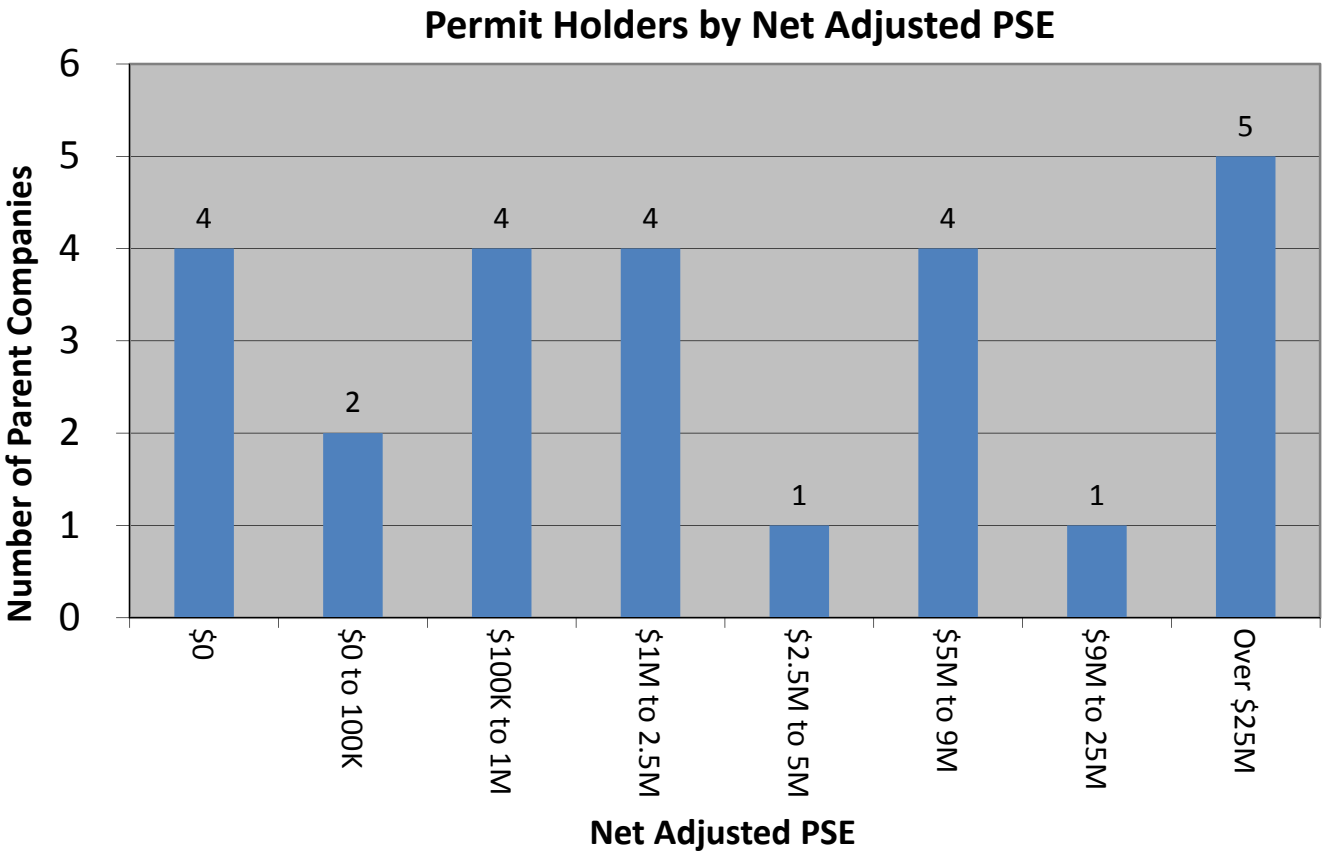
We next compare the estimated total cost of site reclamation developed in the prior step against the amount of private performance security on hand as provided from the ODNR-DMRM data base (Central Tracking System - CTS) files. The private performance security, available should forfeiture occur, may be provided through any of the following means:

- Bond from an insurer licensed to do business in Ohio
- Letter of credit
- Certificate of Deposit
- Cash
- Trust agreements

The amount that the estimated total site cost exceeds the performance security on hand for the site is the potential reclamation cost to the Fund. There are a number of sites where the performance security on hand is greater than the Performance Security Estimate. Of the 168 permits included in the analysis, 35 permits, or nearly 21 percent, fall into this category and contribute zero dollars to our estimated potential and estimated expected Fund costs. In these cases, the Fund would have no reclamation liability in the case of operator default. But we understand that the Fund still could have some potential liability, if the provider of the performance security should become insolvent prior to fulfilling its obligation. This situation occurred on a number of forfeited sites in Ohio in the early 2000s. We also note that the excess of individual permit performance security over the Performance Security Estimate has not been used as an offset to total Fund liabilities, as these monies would not be available to cover other forfeitures.

Estimated Potential Reclamation Fund Cost by Permit Holder

Exhibits 7.1a, 7.1b, and 7.1c provide the estimate of the potential reclamation cost by permit holder. Four permit holders (operators) only have permits with zero net liability to the Fund. In essence, these operators are privately secured at “full cost”. Therefore, 21 of the 25 current permit holders (operators) pose potential liability to the Fund (assuming their performance security providers do not fail).

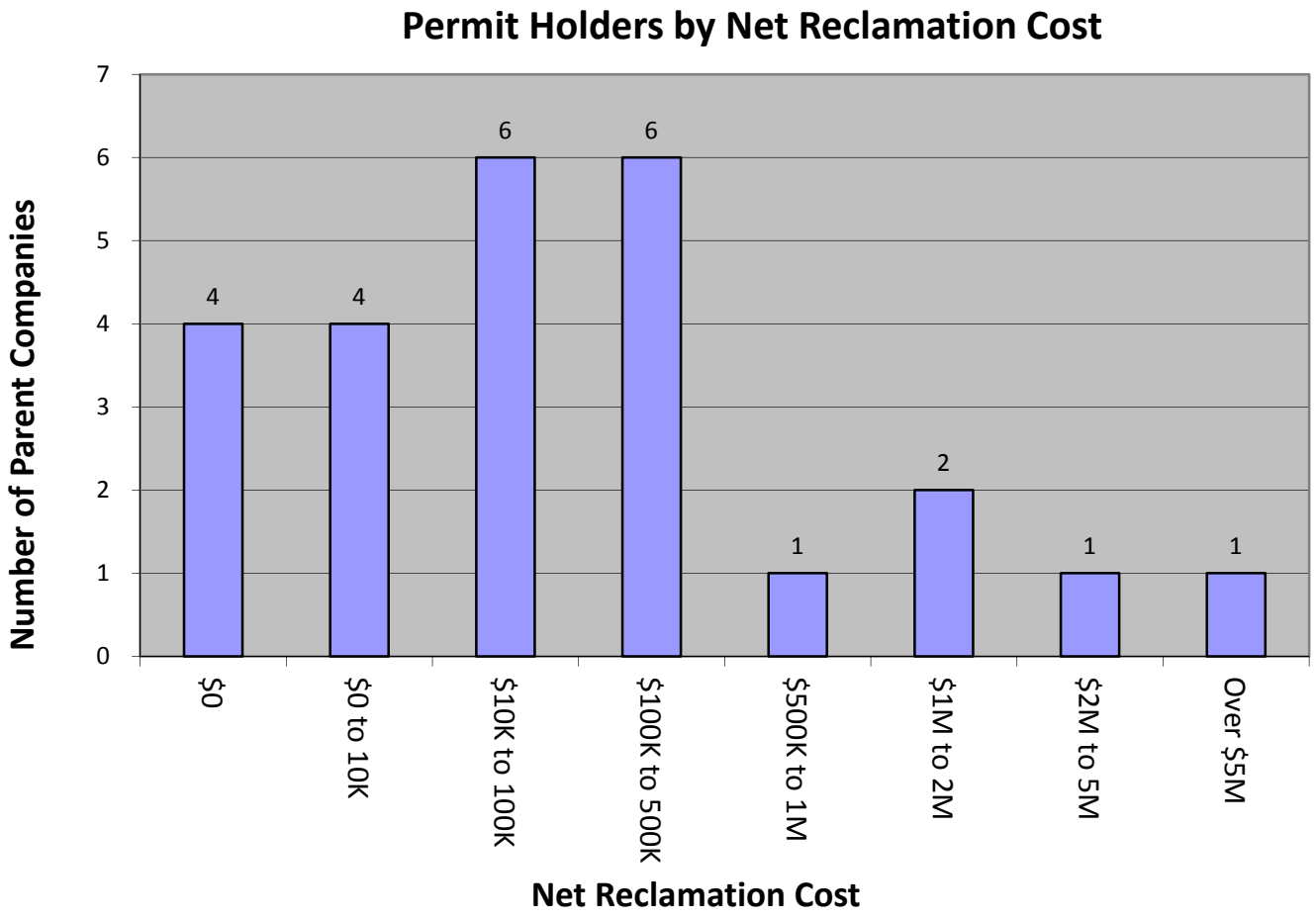


The average potential cost of a permit holder forfeiture of the operators and sites is over $25.7 million per operator ($539.9 million divided by 21 operators with exposure to the Fund). As can be seen in Exhibit 7.1b, the five largest operators exceed the average. We do note that the estimated potential Fund cost for each of the other 16 operators is well below the average of $25.7 million. In fact, the average potential Fund cost of these 16 operators is roughly $3 million. We can conclude that the greatest concentration of risk to the Fund comes from a small number of mine operators.

Comparing the potential cost as obtained from the engineers at the ODNR-DMRM and adjusted for the available performance security with the number of permits with potential cost to the Fund, we develop the average potential cost (PSE per permit) of a forfeited permit of approximately $4.1 million ($539.9 million divided by the 133 permits with potential liability to the Fund). Please see Exhibit 4.3.

As can be seen, the estimated expected Fund cost (Net Reclamation Cost) at the permit holder level for those permits in the study is significantly less than the estimated potential Fund cost (Net Adjusted

PSE) from the permit holder forfeiture. Please see the charts below and Exhibits 7.1a and 7.1b for comparisons. The difference in these figures can be thought of as being similar to the difference between the insured value of a home (potential cost) and the annual premium to insure the home against a multitude of potential losses over the many years of occupancy (expected cost).



Based upon the information in the ODNR-DMRM data base (CTS) for each site within each of the three phases, we have allocated the total estimated reclamation cost to the three reclamation phases. This step is necessary to reflect the differences in the estimated time until full release of the permit and the associated performance security based upon the assigned phase. These time estimates were developed based upon data from a report by the Office of Surface Mining Reclamation and Enforcement that is titled "A Report on the Success of Achieving Reclamation Standards on Surface Coal Mining Operations in Ohio". Please see Exhibit 3.2. As with any estimates, some sites may operate within significantly longer or shorter time periods – especially the active permits.

- For active permits (those without Final Maps), we have assumed that the future life cycle will take 21 years to completely proceed through the various phases of mining operation from coal extraction to land replacement, removal of collection ponds, replanting and reforestation and the maintenance period required to assure that the land is stable and fulfills the requirements of the approved reclamation plan and final release of the permits. At the point of permit release, the exposure to the Fund declines to zero and the private performance security is also fully released.
- For permits with Final Maps and CTS data pending phase 1 release, we assume that phase 1 release will be reached in 3 years. The additional time to release follows the phase 2 and phase 3 timeframes below.
- For permits with Final Maps and CTS data pending phase 2 release, we assume that phase 2 release will be reached in 6 years. The additional time to release follows the phase 3 timeframe below.
- For permits with Final Maps and CTS data pending phase 3 release, we assume that full release will be reached in 8 years.

The $539.9 million in potential cost from the permits in the study are spread across the Active and Final Map Permits within the three phases of reclamation as follows:

- Active Pending Phase 1 $352.6 million
- Active Pending Phase 2 $55.8 million
- Active Pending Phase 3 $23.8 million
- Final Map Pending Phase 1 $94.3 million
- Final Map Pending Phase 2 $11.3 million
- Final Map Pending Phase 3 $2.1 million

Please see Exhibit 4.2. These figures have significance as the permits now fully contained in phases 1, 2 and 3 of reclamation are no longer contributing revenue to the Fund but will continue to expose the Fund to potential cost. Please note that all potential costs are accumulated in the first category with any current activity. Thus, a permit with a final map pending phase 1 may also have some acres in pending phases 2 and 3 of the reclamation process, but all potential costs from the phase 2 or 3 acres would be included in the pending phase 1 category shown above.

Estimated Operator Financial Strength – Potential for Future Default

Since the Fund will only be called upon to financially support a reclamation effort if the permit holder should no longer have the financial resources to complete the effort, we need to consider the probability of forfeiture or financial default of the permit holder/operator. To reflect this potential financial incapacity of the permit holder in our analysis, we have developed average forfeiture probabilities based on Ohio forfeiture data and the forfeiture rates in Kentucky and West Virginia. Please see Exhibit 5.2.

Projection into the Future

The time horizon for potential forfeiture varies based upon the reclamation phase determined by the ODNR-DMRM. For the active permits, we used the longest period available – 21 years for the period of time from current until the reclamation is completed and the permit is released. For the sections of the permits with Final Maps currently working to achieve phase 1 release, we used a shorter period of 17 years to reflect that coal extraction has ceased and reclamation is underway. For the sections of permits currently in process of achieving phase 2 release, we used a 14 year time horizon and for the sections of permits currently within the maintenance period prior to phase 3 and total permit release, we have used 8 years as the appropriate time horizon. Please note that the underlying exposure (cost of reclamation) to the Fund declines when a section moves from one phase to the next in the same fashion as the release of the private performance security declines.

Impact of Future Inflation and Present Value of Estimate

As in our previous report, we include an explicit consideration of future inflation on reclamation costs (materials, fuel and manpower). We also explicitly consider that the costs of future potential liabilities could be discounted to present value based upon expected investment returns. That is - “how much money is needed to be set aside today to cover the costs years into the future?”

In this analysis, we make a separate reclamation cost inflation adjustment that varies by year. The following table displays the inflation rates utilized. These rates were provided by the RFFAB and were based on their internal analysis of costs and expected costs.

Reclamation Cost Inflation Rates	
Year	Rate
2017	0.00%
2018	0.00%
2019	3.00%
2020	3.00%
2021	3.50%
2022	3.50%
2023 & Subs	4.00%

We also use the investment rates to discount the future costs to present value. The rates are based upon United States Treasury Note return rates as of February 21st, 2017. The Treasury Notes are sold for 1, 2, 3, 5, 7, 10, 20 and 30 year investment periods. The final selections reflect the recent returns experienced by the Fund. After discussing likely investment returns with the RFFAB, we determined to lengthen the time period it will take the Fund to move to the more favorable return rates projected by the Treasury. We have interpolated the years in between those available. When investment returns are less than the assumed reclamation cost rates at any one point in time, the Fund liabilities are adversely impacted by cost inflation. Please see Exhibit 8 for a display of the rate of investment returns used in our analysis.

Development of the Estimates of Expected Cost

We develop estimates of the expected cost for each permit by combining the potential cost to the Fund information with the probabilities of forfeiture by permit age over the entire exposure period based upon the current distribution by phase. These forfeiture rates are adjusted to reflect the phase of the mine. The probability of forfeiture declines as the reclamation process transitions from active mining to reclamation and on to final release. Please see Exhibit 5.3. These expected long run average cost estimates by permit are then summed by parent company and then for the Fund in total. In this case, $22.8 million is the estimated long run average expected cost for land reclamation. Exhibit 2.2 summarizes the estimated costs over the next 24 years.

Estimated Expected Cost by Larger Permit Holders

There are a number of sites that would be potentially impacted by a single large company becoming financially troubled. We have also developed estimates by permit holder as well as individual permit. Again, we are reflecting the assumption that if a permit holder should forfeit one permit, then all permits for that entity would simultaneously be forfeited.

Thus, in the case of the forfeiture risk borne by the Fund, there is significant correlation between the default probabilities of various permits. On the other hand, we note that no adjustment is made for any spread of risk between the various permit holders as the concentration of risk is much more significant. One might also look at it from the other perspective, i.e., if the larger permit holders continue to remain solid financially, the potential reclamation costs to the Fund might be much more manageable.

In Exhibit 7.1b, we provide the estimated nominal expected costs for the top five permit holders in terms of total expected cost to the Fund before application of reclamation cost inflation or present value calculations.

Impact of Land Reclamation Cost Inflation and Adjustment to Present Value

We adjust the 2017 nominal estimates to reflect the expected future reclamation cost inflation using the annual rates displayed in a previous table. These figures are then returned to a 2017 present value basis through the use of selected investment rates as previously displayed. Please see Exhibit 2.2 for the results. The following chart shows a summary of the impact of these adjustments to the estimates.

Estimated *EXPECTED* Land Reclamation Fund Cost **After Cost Inflation and Present Value Adjustment**		
	Gross of Bond	**Net of Bond**
Nominal Estimate	**$23,120,248**	**$21,878,115**
Impact of Reclamation Cost Inflation	**4,181,482**	**3,890,224**
Present Value Adjustment	**(3,169,102)**	**(2,953,067)**
Resulting PV Estimate	**24,132,628**	**22,815,272**

Cost of Forfeited Sites Currently in the Reclamation Forfeiture Fund

An additional step is required when reviewing the financial condition of the Fund. We need to account for the sites included in the inventory of forfeited permits that are currently the responsibility of the Fund. As of December 31st, 2010, all reclamation projects of previously forfeited permits had been substantially completed. However, the cost of the recent Valley Mining forfeitures has an impact on the analysis too.

The RFFAB has estimated the cost of the Valley Mining forfeitures will be paid out at a rate of $2.2 million, $2.5 million, and $1.1 million over the next three years (design and construction costs combined).

Potential Cost to the Fund from Bond Company Default

Since the Fund would be responsible for the full cost of reclamation of forfeited sites in the case of an insolvency of a performance security provider, we have attempted to roughly estimate the potential long term cost of this exposure to the Fund. As this has already happened in the past with a number of sites reclaimed by the Fund, this possibility of concurrent permit forfeiture and insurer insolvency is clearly a valid concern. In order for the Fund to be obligated to provide reclamation coverage, there would need to be forfeiture by the permit holder and an insolvency of the bonding company for that permit holder. Bond amounts and account numbers are verified by the bonding company and by the ODNR-DMRM every five years at renewal.

Typically, the performance security provided by the bonding company carries an annual premium for coverage that is irrevocable - even for non-payment of premium. The Fund's exposure to insurer insolvency is typically contained within a period of roughly 12 months rather than across the full life of the permit. The Fund management can require the replacement of a performance security provider in the event of an insurer's insolvency. The Ohio Revised Code allows up to 12 months for the operator to replace the coverage provided by an insolvent surety.

Other alternative financial arrangements do not carry a significant default risk. The following summarizes some of the underlying structure of those programs:

- Irrevocable Letters of Credit (LOC) must be issued for a term of 12 months or more and intent to non-renew requires 60-day notice to the ODNR-DMRM. Verification of validity prior to the expiration date of the LOC and value of the LOC is conducted annually by the ODNR-DMRM.
- Certificates of Deposit are automatically renewable and held at the Treasurer of the State's office. The amount of required security is verified annually at maturity. The Treasurer's office reports to the ODNR-DMRM on any issues monthly.
- Cash is held by the Treasurer of State in a separate fund.

If we assume the probability of forfeiture by a permit operator in any one year is the same as selected for our analysis (0.50% in Exhibit 5.2) and the probability of the insolvency of a performance security provider is equal to the three year average default rate in 2015 for US financial institutions and

insurance providers (0.76 percent) based on a recent Standard & Poor's study, the combined probability of default of both the permit holder and the provider of performance security is 0.50 percent times 0.76 percent, or .0038 percent. When applied to the estimated performance security of the sites included in the Study as provided in the CTS files ($584.9 million), we develop an annual expected cost of approximately $22,700. This expected cost does not appear to be material to the total Fund expected cost.

But it should be noted that, as has actually been previously witnessed, in the event of the situation where both the permit holder AND the performance security provider are unable to meet their obligations with respect to the completion of the reclamation, the actual cost of a provider of performance security to the Fund can be significant and material.

Reclamation Forfeiture Fund Operating Expenses

Reclamation Forfeiture Fund operating expenses include various oversight services provided by ODNR-DMRM personnel, travel cost reimbursements of Advisory Board members, external consulting costs, etc. The ODNR-DMRM booked operating expenses of $335,133 for Fund 5310/Reclamation Forfeiture for Fiscal Year 2016, and has booked $108,448 to the Fund through the first four months of Fiscal Year 2017.

The PSEs that we used to develop our future cost of reclamation estimates already include a 15% mark up for administrative expenses. For our estimates, we have assumed annual expenses of $5,000 for overhead costs not included in the PSEs, a biennial actuarial study at $60,000 per study, spread over two years, and long-term water treatment administrative expense of $10,000. (It should be noted that even though long-term water treatment trusts include operating expenses, our determination of the water treatment costs described below are not based on ODNR-DMRM cost estimates. We therefore add this additional expense in.) Our estimate therefore assumes the need for a periodic update to this type of analysis, annual water treatment administrative expense, and the need for the Advisory Board to meet periodically to discuss critical issues related to the financial operation of the Fund.

Long-Term Water Treatment and Alternative Water Supply

Currently there are three permits determined by ODNR-DMRM to require long-term water treatment. The ODNR-DMRM is monitoring another two permitted sites for potential long-term water treatment. The list of monitored sites is continually being updated as new information becomes available. See Exhibits 9.2a and 9.2b for the current listing of sites designated for water treatment or monitoring.

There is limited data on how these potential long-term water treatment sites might develop. In order to determine an estimated liability on current permits, we considered the limited data available in Ohio along with the somewhat broader data base available from our analysis of West Virginia water reclamation liabilities.

In our first approach we consider the average costs per permitted acre separately for water treatment and capital cost (including cost of set up, annual maintenance and abandonment). We developed averages for the Ohio Consol permit and another set of averages based on West Virginia data. The data for the one Ohio permit does not contain sufficient information to make use of our intended exposure measure of permitted acres. (Consol is showing the footprint of acres rather than the permitted number of acres, which may be different than our intended measure.) Since we only have this one data point for Ohio, we selected the West Virginia cost indications to use in our estimates for Ohio. It should be noted that the West Virginia indications are prior to that state having to meet higher National Pollutant Discharge Elimination System (NPDES) Permit Program standards (implemented in 2011), since Ohio is not currently subject to those standards. That is, we used 2011 West Virginia indications, reduced by our estimate of the 2011 NPDES standards on that state's water capital and water treatment costs.

We also developed an estimate of permitted acres that will be in future need of long-term water treatment. That estimate is the sum of current permitted acres designated for long-term water treatment and a portion of monitored permitted acres. Our initial estimate of the portion of monitored permitted acres that will become treated permitted acres has been set at 5%. There is limited data to estimate how many of the monitored sites will become treatment sites. The 5% estimate was predicated on judgment per our discussions with the ODNR-DMRM.

The ODNR-DMRM selected a 75 year time horizon to estimate future costs. Treatment could be required for an even longer time period, but for practical reasons the ODNR-DMRM established 75 years as their best management decision to account for these types of claims as they surface.

The final piece of the first estimate is to determine a forfeiture rate. There is only a liability to the Fund if the permit is forfeited. We have already selected a 0.50% annual forfeiture rate for all permits in Ohio. That annual forfeiture rate was developed from Ohio, Kentucky and West Virginia lifetime forfeiture rates. We have also selected a lifetime forfeiture rate of 0.50% for permits involving water. Again, there is no data to develop statistical estimates. In discussions with the Board, we conclude that the same rate applied to land forfeitures is appropriate for water forfeitures.

Our first method of estimating the ultimate liability for long-term water treatment on current permits is then simply the product of the number of permitted acres, the average cost per permitted acre, the number of years for payment, and the probability a forfeiture will occur. This method yielded a long-term water cost of $183,050.

Our second estimate utilizes the estimated water treatment cost for the full cost permit #201501. We developed a permit count ratio of permits with water concerns (treatment and monitoring) to total number of permits in the Fund. The actual ratio approaches 4%. We select a projected ratio of 5%. Applying the 5% ratio to the cost for permit #201501 ($2.85 million) produces our second estimate for long-term water treatment liabilities of $142,580.

Based upon these two estimates, we selected a final estimate of $0.5 million. Our selection of $0.5 million is substantially lower than our selection in the previous analysis of $2.25 million. We feel this is appropriate given the minimal amount of activity in setting up water treatment trusts since our last analysis, the monitoring of potential water sites, and the outlook for the need of future trust funds.

We make a final adjustment to the estimate to account for underlying security, primarily in the form of standby trust funds. While these funds are to be set up to cover 100% of the cost of capital and treatment, the operator can spread the funding of standby trusts over five years. In the meantime, the Reclamation Forfeiture Fund provides the remainder of the coverage. The one trust that has already been established is fully funded and presents no liability to the Fund since the trust has a built in mechanism to adjust for shortages over time. Of course, not all permits needing standby trust funds will necessarily have established a trust fund before a forfeiture occurs. In fact, the discovery of the need for water treatment could escalate the probability of forfeiture for permits owned by operators already in economic distress. We selected a 10% credit adjustment factor to apply to our water liability estimate. This 10% adjustment is based on judgment, considering the limited number of trusts that have previously been established. We may need to increase the credit with time if more of these trusts actually become reality.

Applying the 10% mitigating water trust adjustment factor estimate to the selected $500,000 estimated expected costs results in a net $450,000 estimate for long-term water treatment and alternative water supply liabilities. See Exhibit 9.1. As the underlying data for our calculations is very limited and the assumptions made to determine the estimated costs are open to a large range of variation, it is important to note here that final results could in fact deviate substantially from these estimates. The ODNR-DMRM will want to monitor this aspect of the Fund's liability closely and update these estimates as often as practical.

Please note that the above figures for long term water treatment are stated on a basis before inflation and present value are taken into account over the 75 year payout period. After consideration of inflation and present value, the estimated expected cost of $450,000 becomes $701,843. See Exhibit 2.3.

Financial Capacity of the Fund

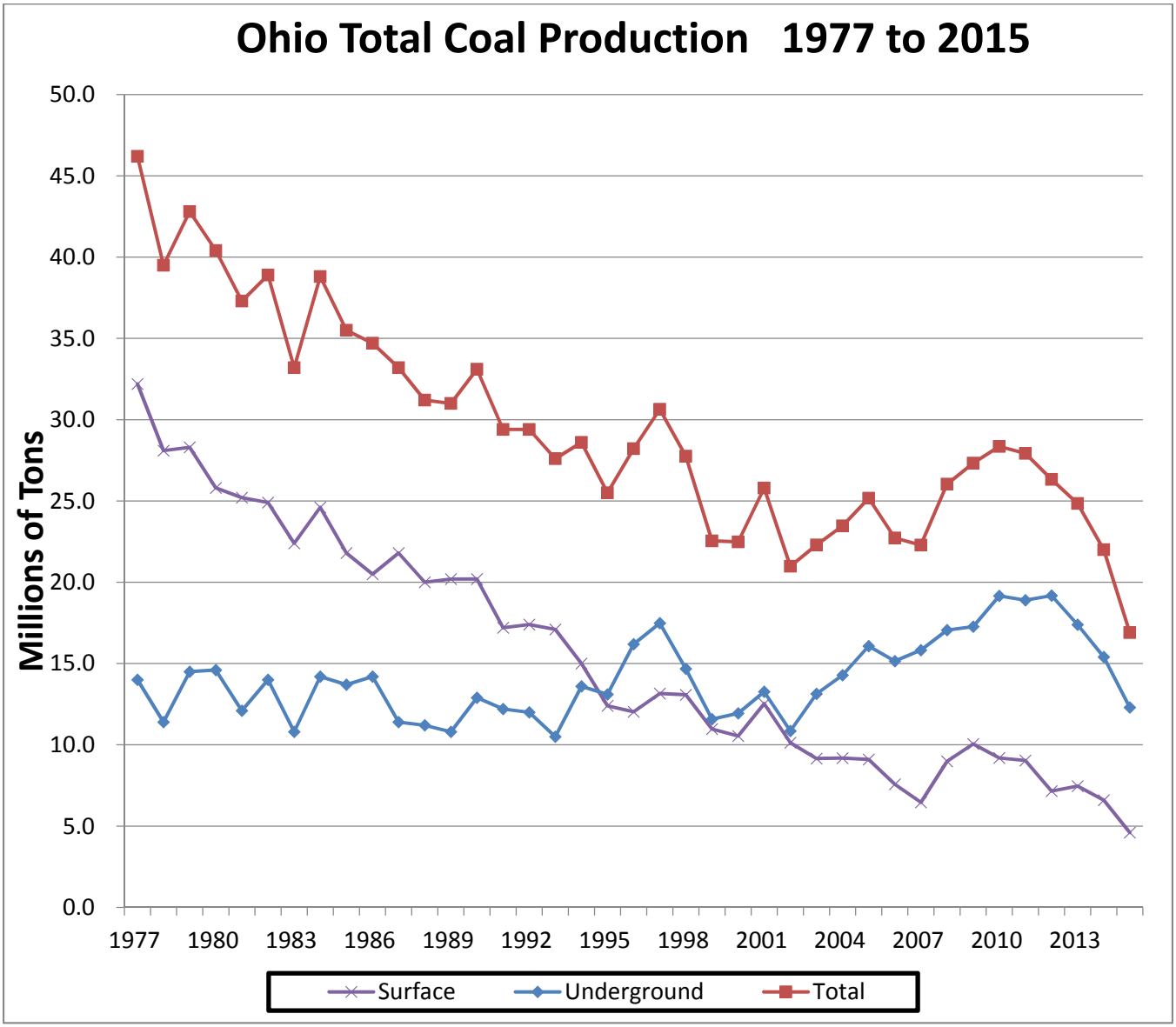
The capital available to operate the Fund is generated from revenues from the severance tax on the covered permit holders based upon their coal production. As explained in other sections of the report, this revenue is not directly related to the liability assumed / forfeiture protection provided by the Fund to the operators nor does it reflect the different financial capacity of each permit holder to fulfill his obligations to complete the land reclamation process. As opposed to an up-front premium payment required by the providers of the underlying private performance security (often to provide security over a single year time horizon) as is provided on "full cost" permits, Ohio's alternative bonding system is comprised of a per acre bond plus a severance tax charged to operators to build capital on an as-you-go basis. The collections from today need to cover the exposure that exists currently from both active mining sites and sites in the process of reclamation as well as potentially provide some additional capital accumulation to cover the current sites in the future.

The dynamic nature of the process whereby portions of the permitted sites move from active mining to phase 1 reclamation to phase 2 reclamation to phase 3 reclamation over time adds a complicating feature to any analysis or comparison of future revenue with either future expected costs. Any increase in mining operations will result in both an increase in revenue and an increase in potential future cost to the Fund. Similarly, declines in mining operations will result in decreased revenue and decreased exposure to the Fund. Since the Fund retains responsibility for forfeited reclamation projects in the years following the cessation of mining operations, the financial exposure to the Fund remains for a number of years after the revenue to the Fund has ceased.

Future Coal Production Projection

Based upon historical coal production figures developed by the Ohio Department of Natural Resources, Division of Geological Survey and provided for our use by the Ohio Department of Natural Resources, we have the historical coal production from surface mining operations and underground mining operations. In the prior review, we used this data to attempt to project coal production into the future and thus the severance tax revenues.

The following chart displays the historical coal production in Ohio.



In our work on another project, we became aware of the "Consensus Coal Production Forecast Report for West Virginia 2014". This report was prepared for the West Virginia Department of Environmental Protection by Christine Rish, Jennifer Shand, and Alicia K. Copley. While this projection is specifically tailored to coal mining in West Virginia, it utilizes economic assumptions with respect to supply and demand related specifically to Northern Appalachia coal. We have developed a projected future annual change in Ohio coal production based upon the changes forecast in Northern Appalachian coal in the Energy Information Administration Annual Energy Outlook 2014 and a study performed by Energy Ventures. We also relied upon the recommendations from the ODNR-DMRM.

COAL PRODUCTION INDEX NORTHERN APPALACHIIA COAL PRODUCTION					
	Energy Information Admin.		Energy Ventures Analysis		Pinnacle Selected
Year	Tons (in millions)	Index to 2015	Short Tons Per Miner Hour	Index to 2015	Index to 2015
2015	117.6	1.0000	3.41	1.0000	1.0000
2016	118.2	1.0057	3.38	0.9912	1.0043
2017	124.1	1.0559	3.36	0.9853	1.0488
2018	87.1	0.7410	3.33	0.9765	0.7645
2019	92.5	0.7865	3.31	0.9707	0.8050
2020	107.5	0.9144	3.28	0.9619	0.9192
2021	102.5	0.8717	3.24	0.9501	0.8796
2022	101.3	0.8620	3.20	0.9384	0.8697
2023	96.6	0.8221	3.16	0.9267	0.8326
2024	93.1	0.7921	3.12	0.9150	0.8043
2025	90.7	0.7717	3.08	0.9032	0.7848
2026	88.8	0.7552	3.04	0.8915	0.7688
2027	86.1	0.7323	3.00	0.8798	0.7471
2028	83.4	0.7091	2.97	0.8710	0.7253
2029	80.4	0.6836	2.93	0.8592	0.7012
2030	78.3	0.6659	2.89	0.8475	0.6841
2031	80.6	0.6858	2.86	0.8387	0.7011
2032	82.4	0.7006	2.83	0.8299	0.7135
2033	84.9	0.7223	2.81	0.8240	0.7325
2034	83.9	0.7138	2.78	0.8152	0.7240
2035	82.6	0.7026	2.75	0.8065	0.7130
2036	81.1	0.6897	2.72	0.7977	0.7005
2037	79.8	0.6788	2.69	0.7889	0.6898
2038	78.6	0.6690	2.67	0.7830	0.6804
2039	81.9	0.6966	2.64	0.7742	0.7044
2040	83.1	0.7065	2.61	0.7654	0.7124
2041	81.1	0.6900			0.6967
2042	80.3	0.6832			0.6898
2043	78.6	0.6683			0.6756
2044	76.9	0.6542			0.6621
2045	75.1	0.6388			0.6475
2046	77.5	0.6596			0.6654
2047	79.1	0.6730			0.6767
2048	76.2	0.6485			0.6540
2049	75.4	0.6415			0.6469
2050	73.4	0.6244			0.6307

We have used the average index to develop a projection of future Ohio coal production. In 2015, there were 16.9 million tons of coal mined in the state of Ohio, of which we attribute 15.2 million tons to operations that participate in the Fund. Based upon the methodology described above, the following table provides the projected future coal production in Ohio for operations under the Fund. It should be noted that the tonnage listed in the table below is a formula projection based on the assumption in the above table. The projections below are on a calendar year basis. Differences are possible if coal production is summarized on a fiscal year basis. Actual results may vary significantly from the projections listed below.

Ohio RFF Coal Production Projections (in million tons)

Year	Average Index	Projected Tons
2016	1.0043	15.3
2017	1.0488	15.9
2018	0.7645	11.6
2019	0.8050	12.2
2020	0.9192	14.0
2021	0.8796	13.4
2022	0.8697	13.2
2023	0.8326	12.7
2024	0.8043	12.2
2025	0.7848	11.9
2026	0.7688	11.7
2027	0.7471	11.4
2028	0.7253	11.0
2029	0.7012	10.7
2030	0.6841	10.4
2031	0.7011	10.7
2032	0.7135	10.8
2033	0.7325	11.1
2034	0.7240	11.0
2035	0.7130	10.8
2036	0.7005	10.6
2037	0.6898	10.5
2038	0.6804	10.3
2039	0.7044	10.7
2040	0.7124	10.8

As in our prior analysis, we feel that this projection is more predictive of the future than the use of an exponential trend of past Ohio coal production.

We caveat these estimates by stating that we assume the demand for coal from Ohio's mines will follow those projected in West Virginia for Northern Appalachia / Steam Coal. These assumptions are less certain the further out in the time horizon one goes. Another important assumption is that the supply of coal is more or less unlimited and thus the revenue to the Fund is not constrained or limited over the time horizon.

The per ton based severance tax rate is predicated upon the Fund balance from the prior year-end according to the following chart:

Fund Balance	Rate per Ton of Coal
Less than $5 Million	$0.16
Between $5 and $10 Million	$0.14
In excess of $10 Million	$0.12

The levels of estimated production along with the severance tax rates would generate between $2.1 and $3.9 million in annual operating capital for the Fund. We understand that currently about 90 percent of the current coal extraction is from Fund covered permits and have adjusted our revenue projections to account for this fact.

Based upon the various projections of future coal production provided, we have developed the following table that displays the estimated revenue from the severance tax that would be generated by these production levels with the added assumption that 90% of the coal production is from operators participating in the Fund. We provide the estimates at the three tax rates currently included in the statute.

OHIO RECLAMATION FORFEITURE FUND ANALYSIS Potential Reclamation Fund Revenue Projection			
Tons (in millions)	**$0.12**	**$0.14**	**$0.16**
10.0	1,200,000	1,400,000	1,600,000
10.5	1,260,000	1,470,000	1,680,000
11.0	1,320,000	1,540,000	1,760,000
11.5	1,380,000	1,610,000	1,840,000
12.0	1,440,000	1,680,000	1,920,000
12.5	1,500,000	1,750,000	2,000,000
13.0	1,560,000	1,820,000	2,080,000
13.5	1,620,000	1,890,000	2,160,000
14.0	1,680,000	1,960,000	2,240,000
14.5	1,740,000	2,030,000	2,320,000
15.0	1,800,000	2,100,000	2,400,000
15.5	1,860,000	2,170,000	2,480,000
16.0	1,920,000	2,240,000	2,560,000
16.5	1,980,000	2,310,000	2,640,000
17.0	2,040,000	2,380,000	2,720,000
17.5	2,100,000	2,450,000	2,800,000
18.0	2,160,000	2,520,000	2,880,000
18.5	2,220,000	2,590,000	2,960,000
19.0	2,280,000	2,660,000	3,040,000
19.5	2,340,000	2,730,000	3,120,000
20.0	2,400,000	2,800,000	3,200,000

Current Fund Balance

The Fund is in the process of collecting the revenue to build up sufficient capital to provide for future potential reclamation projects. The balance in the Fund as of May 2013 was approximately $16.3 million. This capital increased $8.1 million from the December 2010 balance of $8.2 million.

We note that since June 2010, current reclamation work had been substantially completed on forfeited sites. Thus, a grand majority of the severance tax has been added to the Fund. The Fund balance at the end of December 2014 had risen to $21.4 million. The balance continues to increase with an amount of $25.9 million as of November 2016.

Investment Rate of Return

In addition to the revenue received from the severance tax, the capital funds will be invested by the State Treasurer in conservative instruments. We note that the Fund's capital is invested along with all of the other State investments and the returns are allocated back to the Reclamation Forfeiture Fund's account. This investment income opportunity should be included in the projection of possible Fund financial levels.

Based upon the current investment situation, we have assumed that the current returns are slightly less than those seen more historically. The investment rates are based upon recent US Treasury Note return rates. The Treasury Notes are sold for 1, 2, 3, 5, 7, 10, 20 and 30 year investment periods. The final selections reflect the recent returns experienced by the Fund. After discussing likely investment returns with the RFFAB, we determined to lengthen the time period it will take the Fund to move to the more favorable return rates projected by the Treasury. We have interpolated the years between the years available. Please see Exhibit 8 for the resulting rates and discount factors used in our analysis.

Financial Picture – Current Permit Portfolio

One way to view the financial situation and outlook of a dynamic system is to review such an analysis on a current portfolio run-off basis. While we understand that at times the system has operated on an approach where the revenues of present sites have funded the reclamation of previously forfeited sites, our assignment included the task of measuring the current solvency of the Fund. In most analyses of this type, it is not appropriate to only reflect future income without a reflection of the additional potential liabilities. The current permit portfolio approach attempts to match the current capital and expected revenue from the current sites with the potential and expected costs or future liabilities from those same sites. This view eliminates the burden of the past being placed upon the future operations.

In this view, we review the financial picture of the system without the complication of adding any new entrants with respect to permits beyond those currently in the Fund as time goes forward. This view allows us to compare the current Fund Balance and estimated future revenue from only the permits currently in the Fund with the estimated expected costs for the same permits over a time horizon from current until all of the permits are anticipated to have completed phase 3 of the reclamation process.

The addition of new permits would add both revenue and potential cost to the system – estimating the impact of that dynamic would rely upon the information in the current analysis – thus not providing

additional information. Again, as with any estimation of the future, there are many assumptions made and actual results may vary from the estimated expected results. In the case of the Fund, as is shown, these projected financial results can vary significantly and the differences can be very material.

In our estimation of the expected costs, we have assumed that the active mining operations continue fairly uniformly over a 7 year period of time. This is followed by a 5 year period pending phase 2 release and then a 7 year observation period pending phase 3 release. Any acreage pending phase 1 release with no associated mining is assumed to reach phase 1 release in 3 additional years. Because the probability of forfeiture varies based upon the number of years that we are projecting into the future, the expected cost to the Fund from a site will vary - even between years in the same phase of reclamation.

Exhibit 1 summarizes the revenues and costs associated with current permits that are expected to flow through the Fund through 2094. The tonnage fee revenue is based on the assumption of 2015 coal production of 15.2 million tons from the currently issued permits covered by the Fund, changing annually according to the Ohio RFF Coal Production table displayed above, and the associated revenue for the first six years. In the seventh and final year of assumed mining, we assume that coal extraction will be half of the indexed amount or 6.3 million tons from permits currently in-force.

We have credited the Fund with investment income on the prior year surplus – this assumes the current revenue is not invested until after the annual costs are paid. Also, investment income is constrained to not less than zero. The reclamation costs are the expected reclamation costs from Exhibit 2.1. Please note that we have assumed ongoing operating expenses to be $10,000 in the next few years to cover general overhead not included in the land reclamation cost estimates, and another $10,000 for the next 75 years for water treatment expenses not already included in the water treatment reclamation costs.

As can be seen in Exhibit 1, the recent Fund balance of $25.9 million could increase to nearly $32.6 million in the next 75 to 78 years. This figure is on a present value basis, which is a relatively important consideration given the long time horizon associated with water treatment liabilities.

Alternative Approach

One other way of approaching the issue of capital and solvency would be to determine how many additional years with no permit holder forfeitures would be needed to generate sufficient capital to fund the reclamation of various permit holders. For purpose of explanation, we have developed these estimates at four levels based upon expected permit cost:

- the median permit holder,
- the average permit holder value,
- the 5th largest, and
- the largest permit holder.

With this approach, we have utilized the total annual coal production and assumed on-going operating expenses as described above and no on-going reclamation projects. Please see Exhibit 1 – Alternative for the details in the cash flow analysis.

Number of Years with No Forfeitures Needed to Accumulate Capital to Cover the Forfeiture of a Permit Holder

Permit Holder Size	Net Adjusted PSE	Years from 2016
Median	1,881,563	0
Average	25,709,885	2
5th Largest	35,716,288	9
Largest	206,188,502	over 150

These estimates are before inclusion of otherwise expected land reclamation and water treatment liability. Making this adjustment would add several more years to the last three estimates in the table above.

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 1
Cash Flow
(all figures discounted to present value)

Calendar Year	Tonnage Fee	Interest Income	Land Reclamation	Water Reclamation	Operating Expense	Fund Balance
	(1)	(2)	(3)	(4)	(5)	(6)
2016						25,912,186
2017	1,905,000	222,057	2,216,401	0	35,000	25,787,842
2018	1,372,000	317,772	2,412,946	0	35,000	25,029,669
2019	1,423,000	374,276	1,092,559	0	35,000	25,699,386
2020	1,598,000	434,324	1,931,999	5,977	45,000	25,748,734
2021	1,500,000	478,131	1,957,013	6,054	45,000	25,718,798
2022	1,453,000	506,146	1,991,771	6,138	45,000	25,635,035
2023	680,000	521,152	1,927,708	6,228	45,000	24,857,251
2024	0	500,571	1,959,742	6,332	45,000	23,346,748
2025	0	473,246	1,990,946	6,433	45,000	21,777,615
2026	0	441,877	1,435,877	6,531	45,000	20,732,084
2027	0	417,280	750,179	6,629	45,000	20,347,557
2028	0	404,405	538,713	6,726	45,000	20,161,523
2029	0	397,034	483,526	6,822	45,000	20,023,210
2030	0	388,971	490,267	6,917	45,000	19,869,997
2031	0	382,031	496,909	7,011	45,000	19,703,109
2032	0	373,321	503,493	7,103	45,000	19,520,834
2033	0	365,672	180,463	7,195	45,000	19,653,848
2034	0	362,462	69,485	7,285	45,000	19,894,540
2035	0	362,352	70,330	7,374	45,000	20,134,188
2036	0	360,690	71,165	7,461	45,000	20,371,251
2037	0	358,793	59,931	7,548	45,000	20,617,565
2038	0	355,651	60,613	7,633	45,000	20,859,969
2039	0	353,536	61,285	7,718	45,000	21,099,502
2040	0	350,015	61,952	7,802	45,000	21,334,764
2041	0	347,493	0	7,885	10,000	21,664,372
2042	0	346,317	0	7,966	10,000	21,992,723
2043	0	343,782	0	8,046	10,000	22,318,458
2044	0	342,178	0	8,125	10,000	22,642,511
2045	0	339,257	0	8,203	10,000	22,963,565
2046	0	337,244	0	8,280	10,000	23,282,530
2047	0	335,458	0	8,448	10,000	23,599,539
2048	0	329,994	0	8,527	10,000	23,911,006
2049	0	324,484	0	8,606	10,000	24,216,884
2050	0	318,940	0	8,686	10,000	24,517,137
2051	0	313,368	0	8,767	10,000	24,811,738
2052	0	307,777	0	8,849	10,000	25,100,665
2053	0	302,175	0	8,931	10,000	25,383,908
2054	0	296,569	0	9,015	10,000	25,661,462
2055	0	290,966	0	9,099	10,000	25,933,330
2056	0	285,373	0	9,183	10,000	26,199,520
2057	0	279,797	0	9,269	10,000	26,460,047
2058	0	274,242	0	9,355	10,000	26,714,934
2059	0	268,715	0	9,443	10,000	26,964,206
2060	0	263,220	0	9,530	10,000	27,207,896
2061	0	257,763	0	9,619	10,000	27,446,040
2062	0	252,348	0	9,709	10,000	27,678,679
2063	0	246,979	0	9,799	10,000	27,905,858
2064	0	241,659	0	9,891	10,000	28,127,627
2065	0	236,393	0	9,983	10,000	28,344,038
2066	0	231,184	0	10,076	10,000	28,555,146
2067	0	226,035	0	10,170	10,000	28,761,011
2068	0	220,947	0	10,264	10,000	28,961,694
2069	0	215,925	0	10,360	10,000	29,157,259
2070	0	210,970	0	10,457	10,000	29,347,772

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 1
Cash Flow
(all figures discounted to present value)

Calendar Year	Tonnage Fee	Interest Income	Land Reclamation	Water Reclamation	Operating Expense	Fund Balance
	(1)	(2)	(3)	(4)	(5)	(6)
2071	0	206,083	0	10,554	10,000	29,533,301
2072	0	201,267	0	10,652	10,000	29,713,916
2073	0	196,524	0	10,752	10,000	29,889,689
2074	0	191,854	0	10,852	10,000	30,060,691
2075	0	187,259	0	10,953	10,000	30,226,997
2076	0	182,740	0	11,055	10,000	30,388,682
2077	0	178,297	0	11,158	10,000	30,545,821
2078	0	173,931	0	11,262	10,000	30,698,491
2079	0	169,644	0	11,367	10,000	30,846,768
2080	0	165,434	0	11,473	10,000	30,990,729
2081	0	161,302	0	11,580	10,000	31,130,452
2082	0	157,249	0	11,687	10,000	31,266,014
2083	0	153,274	0	11,796	10,000	31,397,492
2084	0	149,378	0	11,906	10,000	31,524,963
2085	0	145,559	0	12,017	10,000	31,648,505
2086	0	141,818	0	12,129	10,000	31,768,195
2087	0	138,155	0	12,242	10,000	31,884,107
2088	0	134,568	0	12,356	10,000	31,996,319
2089	0	131,058	0	12,471	10,000	32,104,906
2090	0	127,623	0	12,587	10,000	32,209,941
2091	0	124,263	0	12,705	10,000	32,311,498
2092	0	120,977	0	12,823	10,000	32,409,652
2093	0	117,764	0	12,943	10,000	32,504,473
2094	0	114,624	0	13,063	10,000	32,596,034
Total	9,931,000	21,859,963	22,815,272	701,843	1,590,000	

Tonnage Fee	
Fund Balance	Rate
< $5M	0.16
$5M - $10M	0.14
> $10M	0.12

Footnotes:

All columns shown at present value, based on Exhibit 8, Investment Rates

(1) Based on coal production from the Ohio Department of Natural Resources, Division of Geological Survey.
Future production based on the report "Annual Energy Outlook 2017 with projections to 2050" by the Energy Information Administration
The per ton fee is predicated upon the prior year Fund Balance in column (6) according to the
chart at the bottom of the second page, titled Tonnage Fee.
Active mining continues for seven years, with the seventh year coal production being half the prior year. See Exhibit 3.1.

(2) [Prior year Col (6) x Exhibit 8 Col (1)] + [Col (1) / 2 x Exhibit 8 Col (1)]. Years 2046 and subsequent based on 3.040% discount factor

(3) Exhibit 2.1 Col (2).

(4) Exhibit 2.1 Col (4).

(5) Based on discussion with client. Inflation and discount rates assumed to offset.
Majority of expense for land reclamation, based on 15% load in PSEs. Others include:

Overhead $5,000	Actuarial/2 yrs $60,000	Water Treatment $10,000

(6) Year 2016 client provided data. Subsequent years = prior year col (6) + Col (1) + Col (2) - Col (3) - Col (4) - Col (5)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 1 - Alternative
Cash Flow - Number of Years to Accumulate Capital to Cover a Forfeiture
(all figures discounted to present value)

Calendar Year	Tonnage Fee	Interest Income	Land Reclamation	Water Reclamation	Operating Expense	Fund Balance
	(1)	(2)	(3)	(4)	(5)	(6)
2016						25,912,186
2017	1,905,000	222,057	2,216,401	0	35,000	25,787,842
2018	1,372,000	317,772	2,412,946	0	35,000	25,029,669
2019	1,423,000	374,276	1,092,559	0	35,000	25,699,386
2020	1,598,000	434,324	0	0	45,000	27,686,711
2021	1,500,000	513,099	0	0	45,000	29,654,809
2022	1,453,000	581,479	0	0	45,000	31,644,288
2023	1,360,000	648,541	0	0	45,000	33,607,829
2024	1,285,000	689,727	0	0	45,000	35,537,556
2025	1,224,000	732,763	0	0	45,000	37,449,319
2026	1,171,000	771,743	0	0	45,000	39,347,061
2027	1,110,000	803,120	0	0	45,000	41,215,181
2028	1,052,000	829,600	0	0	45,000	43,051,782
2029	992,000	857,572	0	0	45,000	44,856,354
2030	943,000	880,539	0	0	45,000	46,634,893
2031	942,000	905,684	0	0	45,000	48,437,577
2032	934,000	926,611	0	0	45,000	50,253,188
2033	934,000	950,110	0	0	45,000	52,092,299
2034	899,000	968,991	0	0	45,000	53,915,290
2035	861,000	989,834	0	0	45,000	55,721,124
2036	823,000	1,005,577	0	0	45,000	57,504,701
2037	789,000	1,019,762	0	0	45,000	59,268,462
2038	756,000	1,028,895	0	0	45,000	61,008,358
2039	761,000	1,040,421	0	0	45,000	62,764,778
2040	748,000	1,047,397	0	0	45,000	64,515,175
2041	711,000	1,056,590	0	0	10,000	66,272,765
2042	684,000	1,064,875	0	0	10,000	68,011,640
2043	651,000	1,068,220	0	0	10,000	69,720,860
2044	619,000	1,073,680	0	0	10,000	71,403,539
2045	588,000	1,074,258	0	0	10,000	73,055,797
2046	586,000	1,077,205	0	0	10,000	74,709,003
2047	585,000	1,080,632	0	0	10,000	76,364,634
2048	549,000	1,071,649	0	0	10,000	77,975,283
2049	527,000	1,061,740	0	0	10,000	79,554,023
2050	498,000	1,051,016	0	0	10,000	81,093,039
2051	478,000	1,039,551	0	0	10,000	82,600,591
2052	459,000	1,027,464	0	0	10,000	84,077,054
2053	441,000	1,014,817	0	0	10,000	85,522,871
2054	423,000	1,001,663	0	0	10,000	86,937,534
2055	406,000	988,055	0	0	10,000	88,321,589
2056	390,000	974,047	0	0	10,000	89,675,636
2057	374,000	959,684	0	0	10,000	90,999,320
2058	359,000	945,012	0	0	10,000	92,293,332
2059	344,000	930,072	0	0	10,000	93,557,404
2060	331,000	914,908	0	0	10,000	94,793,312
2061	317,000	899,558	0	0	10,000	95,999,870
2062	304,000	884,052	0	0	10,000	97,177,921
2063	292,000	868,428	0	0	10,000	98,328,349
2064	280,000	852,717	0	0	10,000	99,451,066
2065	269,000	836,949	0	0	10,000	100,547,015
2066	258,000	821,150	0	0	10,000	101,616,165
2067	248,000	805,347	0	0	10,000	102,659,512
2068	238,000	789,564	0	0	10,000	103,677,076
2069	228,000	773,818	0	0	10,000	104,668,894
2070	219,000	758,132	0	0	10,000	105,636,026

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 1 - Alternative
Cash Flow - Number of Years to Accumulate Capital to Cover a Forfeiture
(all figures discounted to present value)

Calendar Year	Tonnage Fee	Interest Income	Land Reclamation	Water Reclamation	Operating Expense	Fund Balance
	(1)	(2)	(3)	(4)	(5)	(6)
2071	210,000	742,525	0	0	10,000	106,578,551
2072	202,000	727,014	0	0	10,000	107,497,565
2073	194,000	711,616	0	0	10,000	108,393,181
2074	186,000	696,345	0	0	10,000	109,265,526
2075	179,000	681,213	0	0	10,000	110,115,738
2076	171,000	666,231	0	0	10,000	110,942,969
2077	164,000	651,408	0	0	10,000	111,748,376
2078	158,000	636,758	0	0	10,000	112,533,135
2079	151,000	622,289	0	0	10,000	113,296,424
2080	145,000	608,007	0	0	10,000	114,039,431
2081	140,000	593,923	0	0	10,000	114,763,354
2082	134,000	580,042	0	0	10,000	115,467,396
2083	129,000	566,368	0	0	10,000	116,152,765
2084	123,000	552,905	0	0	10,000	116,818,670
2085	118,000	539,656	0	0	10,000	117,466,326
2086	114,000	526,628	0	0	10,000	118,096,954
2087	109,000	513,822	0	0	10,000	118,709,776
2088	105,000	501,241	0	0	10,000	119,306,016
2089	100,000	488,885	0	0	10,000	119,884,901
2090	96,000	476,754	0	0	10,000	120,447,655
2091	93,000	464,854	0	0	10,000	120,995,509
2092	89,000	453,183	0	0	10,000	121,527,692
2093	85,000	441,739	0	0	10,000	122,044,431
2094	82,000	430,523	0	0	10,000	122,546,954
2160	5,000	66,739	0	0	10,000	136,653,212
2161	5,000	64,799	0	0	10,000	136,713,011
2162	5,000	62,915	0	0	10,000	136,770,926
2163	5,000	61,084	0	0	10,000	136,827,011
Total	44,603,000	74,313,730	5,721,906	0	2,280,000	

Tonnage Fee	
Fund Balance	Rate
< $5M	0.16
$5M - $10M	0.14
> $10M	0.12

Number of Years with No Forfeitures Needed to Accumulate Capital to Cover the Forfeiture of a Permit Holder

Permit Holder Size	Net Adjusted PSE	Years from 2016
Median	1,881,563	0
Average	25,709,885	2
5th Largest	35,716,288	9
Largest	206,188,502	Over 150

Number of Years with No Forfeitures Needed to Accumulate Capital to Cover the Forfeiture of a Permit Holder and otherwise expected land and water reclamations costs

Permit Holder Size	Net Adjusted PSE	Years from 2016
Median	25,398,678	1
Average	49,227,000	16
5th Largest	59,233,403	21
Largest	229,705,617	Over 150

Footnotes:

All columns shown at present value, based on Exhibit 8, Investment Rates

(1) Based on coal production from the Ohio Department of Natural Resources, Division of Geological Survey.
Future production based on the report "Annual Energy Outlook 2017 with projections to 2050" by the Energy Information Administration
The per ton fee is predicated upon the prior year Fund Balance in column (6) according to the
chart at the bottom of the second page, titled Tonnage Fee.

(2) [Prior year Col (6) x Exhibit 8 Col (1)] + [Col (1) / 2 x Exhibit 8 Col (1)]. Years 2046 and subsequent based on 3.040% discount factor

(3) Years 2017-2019 reflect Valley Mining Payments.

(4) Assume no losses

(5) Based on discussion with client. Inflation and discount rates assumed to offset.

(6) Year 2016 client provided data. Subsequent years = prior year col (6) + Col (1) + Col (2) - Col (3) - Col (4) - Col (5)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

SPRING 2017

Exhibit 1 - Shock Loss

Cash Flow - Shock Loss Scenario with a Maximum Land Reclamation Cost Per Year of $3,500,000

(all figures discounted to present value)

Calendar Year	Tonnage Fee	Interest Income	Land Reclamation	Water Reclamation	Operating Expense	Fund Balance
	(1)	(2)	(3)	(4)	(5)	(6)
2016						25,912,186
2017	1,905,000	222,057	2,216,401	0	35,000	25,787,842
2018	1,372,000	317,772	2,412,946	0	35,000	25,029,669
2019	1,423,000	374,276	1,092,559	0	35,000	25,699,386
2020	1,598,000	434,324	**3,500,000**	5,977	45,000	24,180,734
2021	1,500,000	449,839	**3,500,000**	6,054	45,000	22,579,518
2022	1,453,000	446,062	**3,500,000**	6,138	45,000	20,927,442
2023	680,000	426,701	**3,500,000**	6,228	45,000	18,482,915
2024	0	372,206	**3,500,000**	6,332	45,000	15,303,789
2025	0	310,212	**3,500,000**	6,433	45,000	12,062,568
2026	0	244,755	**3,500,000**	6,531	45,000	8,755,791
2027	0	176,230	**3,500,000**	6,629	45,000	5,380,393
2028	0	106,935	**3,500,000**	6,726	45,000	1,935,601
2029	0	38,117	**3,500,000**	6,822	45,000	(1,578,103)
2030	0	0	**3,500,000**	6,917	45,000	(5,130,020)
2031	0	0	**3,164,534**	7,011	45,000	(8,346,565)
2032	0	0	503,493	7,103	45,000	(8,902,161)
2033	0	0	180,463	7,195	45,000	(9,134,819)
2034	0	0	69,485	7,285	45,000	(9,256,589)
2035	0	0	70,330	7,374	45,000	(9,379,293)
2036	0	0	71,165	7,461	45,000	(9,502,919)
2037	0	0	59,931	7,548	45,000	(9,615,398)
2038	0	0	60,613	7,633	45,000	(9,728,645)
2039	0	0	61,285	7,718	45,000	(9,842,648)
2040	0	0	61,952	7,802	45,000	(9,957,402)
2041	0	0	0	7,885	10,000	(9,975,286)
2042	0	0	0	7,966	10,000	(9,993,252)
2043	0	0	0	8,046	10,000	(10,011,299)
2044	0	0	0	8,125	10,000	(10,029,424)
2045	0	0	0	8,203	10,000	(10,047,627)
2046	0	0	0	8,280	10,000	(10,065,907)
2047	0	0	0	8,448	10,000	(10,084,355)
2048	0	0	0	8,527	10,000	(10,102,882)
2049	0	0	0	8,606	10,000	(10,121,488)
2050	0	0	0	8,686	10,000	(10,140,175)
2051	0	0	0	8,767	10,000	(10,158,942)
2052	0	0	0	8,849	10,000	(10,177,791)
2053	0	0	0	8,931	10,000	(10,196,723)
2054	0	0	0	9,015	10,000	(10,215,737)
2055	0	0	0	9,099	10,000	(10,234,836)
2056	0	0	0	9,183	10,000	(10,254,019)
2057	0	0	0	9,269	10,000	(10,273,288)
2058	0	0	0	9,355	10,000	(10,292,644)
2059	0	0	0	9,443	10,000	(10,312,086)
2060	0	0	0	9,530	10,000	(10,331,617)
2061	0	0	0	9,619	10,000	(10,351,236)
2062	0	0	0	9,709	10,000	(10,370,945)
2063	0	0	0	9,799	10,000	(10,390,744)
2064	0	0	0	9,891	10,000	(10,410,635)
2065	0	0	0	9,983	10,000	(10,430,618)
2066	0	0	0	10,076	10,000	(10,450,693)
2067	0	0	0	10,170	10,000	(10,470,863)
2068	0	0	0	10,264	10,000	(10,491,127)
2069	0	0	0	10,360	10,000	(10,511,488)
2070	0	0	0	10,457	10,000	(10,531,944)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

SPRING 2017

Exhibit 1 - Shock Loss

Cash Flow - Shock Loss Scenario with a Maximum Land Reclamation Cost Per Year of $3,500,000

(all figures discounted to present value)

Calendar Year	Tonnage Fee	Interest Income	Land Reclamation	Water Reclamation	Operating Expense	Fund Balance
	(1)	(2)	(3)	(4)	(5)	(6)
2071	0	0	0	10,554	10,000	(10,552,498)
2072	0	0	0	10,652	10,000	(10,573,150)
2073	0	0	0	10,752	10,000	(10,593,902)
2074	0	0	0	10,852	10,000	(10,614,754)
2075	0	0	0	10,953	10,000	(10,635,707)
2076	0	0	0	11,055	10,000	(10,656,762)
2077	0	0	0	11,158	10,000	(10,677,919)
2078	0	0	0	11,262	10,000	(10,699,181)
2079	0	0	0	11,367	10,000	(10,720,548)
2080	0	0	0	11,473	10,000	(10,742,021)
2081	0	0	0	11,580	10,000	(10,763,600)
2082	0	0	0	11,687	10,000	(10,785,288)
2083	0	0	0	11,796	10,000	(10,807,084)
2084	0	0	0	11,906	10,000	(10,828,990)
2085	0	0	0	12,017	10,000	(10,851,007)
2086	0	0	0	12,129	10,000	(10,873,137)
2087	0	0	0	12,242	10,000	(10,895,379)
2088	0	0	0	12,356	10,000	(10,917,735)
2089	0	0	0	12,471	10,000	(10,940,206)
2090	0	0	0	12,587	10,000	(10,962,794)
2091	0	0	0	12,705	10,000	(10,985,498)
2092	0	0	0	12,823	10,000	(11,008,322)
2093	0	0	0	12,943	10,000	(11,031,264)
2094	0	0	0	13,063	10,000	(11,054,327)
Total	9,931,000	3,919,487	48,525,157	701,843	1,590,000	

Tonnage Fee

Fund Balance	Rate
< $5M	0.16
$5M - $10M	0.14
> $10M	0.12

Footnotes:

All columns shown at present value, based on Exhibit 8, Investment Rates

(1) Based on coal production from the Ohio Department of Natural Resources, Division of Geological Survey.
Future production based on the report "Annual Energy Outlook 2017 with projections to 2050" by the Energy Information Administration
The per ton fee is predicated upon the prior year Fund Balance in column (6) according to the
chart at the bottom of the second page, titled Tonnage Fee.
Active mining continues for seven years, with the seventh year coal production being half the prior year. See Exhibit 3.1.

(2) [Prior year Col (6) x Exhibit 8 Col (1)] + [Col (1) / 2 x Exhibit 8 Col (1)]. Years 2046 and subsequent based on 3.040% discount factor

(3) Exhibit 2.1 Col (2).
* In addition, Years 2020-2024 include a shock loss of $25,709,885, derived in Exhibit 7.1b Col (3), spread evenly over five years.

(4) Exhibit 2.1 Col (4).

(5) Based on discussion with client. Inflation and discount rates assumed to offset.

(6) Year 2016 client provided data. Subsequent years = prior year col (6) + Col (1) + Col (2) - Col (3) - Col (4) - Col (5)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 2.1
Total Expenditures

Calendar	Land Reclamation		Water Reclamation				
Year	Gross	Net	Gross	Net	Operating Expense	Gross Total	Net Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2016							
2017	2,216,401	2,216,401	0	0	35,000	2,251,401	2,251,401
2018	2,412,946	2,412,946	0	0	35,000	2,447,946	2,447,946
2019	1,092,559	1,092,559	0	0	35,000	1,127,559	1,127,559
2020	2,083,607	1,931,999	6,641	5,977	45,000	2,135,248	1,982,976
2021	2,110,886	1,957,013	6,727	6,054	45,000	2,162,613	2,008,067
2022	2,147,974	1,991,771	6,820	6,138	45,000	2,199,793	2,042,909
2023	2,080,558	1,927,708	6,921	6,228	45,000	2,132,478	1,978,936
2024	2,115,132	1,959,742	7,036	6,332	45,000	2,167,168	2,011,074
2025	2,148,810	1,990,946	7,148	6,433	45,000	2,200,958	2,042,379
2026	1,540,407	1,435,877	7,257	6,531	45,000	1,592,664	1,487,408
2027	809,699	750,179	7,365	6,629	45,000	862,064	801,808
2028	576,874	538,713	7,473	6,726	45,000	629,347	590,439
2029	518,425	483,526	7,580	6,822	45,000	571,005	535,348
2030	525,653	490,267	7,685	6,917	45,000	578,338	542,184
2031	532,773	496,909	7,789	7,011	45,000	585,563	548,919
2032	539,833	503,493	7,893	7,103	45,000	592,725	555,596
2033	195,570	180,463	7,994	7,195	45,000	248,564	232,658
2034	73,999	69,485	8,095	7,285	45,000	127,094	121,770
2035	74,900	70,330	8,193	7,374	45,000	128,093	122,704
2036	75,789	71,165	8,290	7,461	45,000	129,079	123,626
2037	63,878	59,931	8,386	7,548	45,000	117,264	112,479
2038	64,605	60,613	8,482	7,633	45,000	118,087	113,247
2039	65,321	61,285	8,576	7,718	45,000	118,897	114,003
2040	66,032	61,952	8,669	7,802	45,000	119,701	114,754
2041	0	0	8,761	7,885	10,000	18,761	17,885
2042	0	0	8,851	7,966	10,000	18,851	17,966
2043	0	0	8,940	8,046	10,000	18,940	18,046
2044	0	0	9,028	8,125	10,000	19,028	18,125
2045	0	0	9,115	8,203	10,000	19,115	18,203
2046	0	0	9,200	8,280	10,000	19,200	18,280
2047	0	0	9,387	8,448	10,000	19,387	18,448
2048	0	0	9,474	8,527	10,000	19,474	18,527
2049	0	0	9,562	8,606	10,000	19,562	18,606
2050	0	0	9,652	8,686	10,000	19,652	18,686
2051	0	0	9,741	8,767	10,000	19,741	18,767
2052	0	0	9,832	8,849	10,000	19,832	18,849
2053	0	0	9,924	8,931	10,000	19,924	18,931
2054	0	0	10,016	9,015	10,000	20,016	19,015
2055	0	0	10,110	9,099	10,000	20,110	19,099
2056	0	0	10,204	9,183	10,000	20,204	19,183
2057	0	0	10,299	9,269	10,000	20,299	19,269
2058	0	0	10,395	9,355	10,000	20,395	19,355
2059	0	0	10,492	9,443	10,000	20,492	19,443
2060	0	0	10,589	9,530	10,000	20,589	19,530
2061	0	0	10,688	9,619	10,000	20,688	19,619
2062	0	0	10,788	9,709	10,000	20,788	19,709
2063	0	0	10,888	9,799	10,000	20,888	19,799
2064	0	0	10,990	9,891	10,000	20,990	19,891
2065	0	0	11,092	9,983	10,000	21,092	19,983
2066	0	0	11,195	10,076	10,000	21,195	20,076
2067	0	0	11,300	10,170	10,000	21,300	20,170
2068	0	0	11,405	10,264	10,000	21,405	20,264
2069	0	0	11,511	10,360	10,000	21,511	20,360
2070	0	0	11,618	10,457	10,000	21,618	20,457

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 2.1
Total Expenditures

Calendar	Land Reclamation		Water Reclamation				
Year	Gross	Net	Gross	Net	Operating Expense	Gross Total	Net Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2071	0	0	11,727	10,554	10,000	21,727	20,554
2072	0	0	11,836	10,652	10,000	21,836	20,652
2073	0	0	11,946	10,752	10,000	21,946	20,752
2074	0	0	12,057	10,852	10,000	22,057	20,852
2075	0	0	12,170	10,953	10,000	22,170	20,953
2076	0	0	12,283	11,055	10,000	22,283	21,055
2077	0	0	12,398	11,158	10,000	22,398	21,158
2078	0	0	12,513	11,262	10,000	22,513	21,262
2079	0	0	12,630	11,367	10,000	22,630	21,367
2080	0	0	12,747	11,473	10,000	22,747	21,473
2081	0	0	12,866	11,580	10,000	22,866	21,580
2082	0	0	12,986	11,687	10,000	22,986	21,687
2083	0	0	13,107	11,796	10,000	23,107	21,796
2084	0	0	13,229	11,906	10,000	23,229	21,906
2085	0	0	13,352	12,017	10,000	23,352	22,017
2086	0	0	13,477	12,129	10,000	23,477	22,129
2087	0	0	13,602	12,242	10,000	23,602	22,242
2088	0	0	13,729	12,356	10,000	23,729	22,356
2089	0	0	13,857	12,471	10,000	23,857	22,471
2090	0	0	13,986	12,587	10,000	23,986	22,587
2091	0	0	14,116	12,705	10,000	24,116	22,705
2092	0	0	14,248	12,823	10,000	24,248	22,823
2093	0	0	14,381	12,943	10,000	24,381	22,943
2094	0	0	14,515	13,063	10,000	24,515	23,063
Total	24,132,628	22,815,272	779,826	701,843	1,590,000	26,502,454	25,107,115

Footnotes:

(1) Exhibit 2.2 Col (3). Inflated and discounted reclamation costs.
(2) Exhibit 2.2 Col (6). Inflated and discounted reclamation costs.
(3) Exhibit 2.3 Col (3). Inflated and discounted reclamation costs.
(4) Exhibit 2.3 Col (6). Inflated and discounted reclamation costs.
(5) Client provided data
(6) Col (1) + Col (3) + Col (5)
(7) Col (2) + Col (4) + Col (5)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

SPRING 2017

Exhibit 2.2

Land Reclamation Expenditures

Calendar	Gross			Net		
Year	Expenditure	Inflated	Discounted	Expenditure	Inflated	Discounted
	(1)	(2)	(3)	(4)	(5)	(6)
2016						
2017	**2,225,580**	2,225,580	2,216,401	**2,225,580**	2,225,580	2,216,401
2018	**2,452,499**	2,452,499	2,412,946	**2,452,499**	2,452,499	2,412,946
2019	**1,110,589**	1,127,125	1,092,559	**1,110,589**	1,127,125	1,092,559
2020	2,091,672	2,186,500	2,083,607	1,939,478	2,027,405	1,931,999
2021	2,091,972	2,257,878	2,110,886	1,939,478	2,093,290	1,957,013
2022	2,099,727	2,345,567	2,147,974	1,947,033	2,174,995	1,991,771
2023	2,004,230	2,322,841	2,080,558	1,856,988	2,152,191	1,927,708
2024	2,004,230	2,415,754	2,115,132	1,856,988	2,238,279	1,959,742
2025	2,004,230	2,512,385	2,148,810	1,856,988	2,327,810	1,990,946
2026	1,415,073	1,844,805	1,540,407	1,319,048	1,719,619	1,435,877
2027	732,876	993,655	809,699	679,003	920,612	750,179
2028	514,610	725,632	576,874	480,568	677,631	538,713
2029	455,977	668,675	518,425	425,282	623,662	483,526
2030	455,977	695,422	525,653	425,282	648,608	490,267
2031	455,977	723,239	532,773	425,282	674,552	496,909
2032	455,977	752,168	539,833	425,282	701,535	503,493
2033	163,094	279,797	195,570	150,496	258,184	180,463
2034	60,946	108,738	73,999	57,228	102,105	69,485
2035	60,946	113,088	74,900	57,228	106,189	70,330
2036	60,946	117,611	75,789	57,228	110,437	71,165
2037	50,780	101,914	63,878	47,642	95,616	59,931
2038	50,780	105,990	64,605	47,642	99,441	60,613
2039	50,780	110,230	65,321	47,642	103,419	61,285
2040	50,780	114,639	66,032	47,642	107,556	61,952
Total	23,120,248	27,301,730	24,132,628	21,878,115	25,768,339	22,815,272

Footnotes:

(1) See report for details.
Years 2017-2019 reflect current reclamation projects
Payments for future forfeitures delayed by three years to reflect period between forfeiture order and reclamation activity.

(2) Col (1) x annual inflation of…
0.0% for years 2017-18
3.0% for years 2019-20
3.5% for years 2021-22
4.0% for years 2023 & Subs

(3) Col (2) + Col (2) x Exhibit 8 Col (3)

(4) See report for details
Years 2017-2019 reflect current reclamation projec
Payments for future forfeitures delayed by three years to reflect period between forfeiture order and reclamation activity.

(5) Col (4) x annual inflation of…
0.0% for years 2017-18
3.0% for years 2019-20
3.5% for years 2021-22
4.0% for years 2023 & Subs

(6) Col (5) + Col (5) x Exhibit 8 Col (3)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 2.3
Water Reclamation Expenditures

Calendar	Gross			Net		
Year	Expenditure	Inflated	Discounted	Expenditure	Inflated	Discounted
	(1)	(2)	(3)	(4)	(5)	(6)
2016						
2017	0	0	0	0	0	0
2018	0	0	0	0	0	0
2019	0	0	0	0	0	0
2020	6,667	6,969	6,641	6,000	6,272	5,977
2021	6,667	7,195	6,727	6,000	6,476	6,054
2022	6,667	7,447	6,820	6,000	6,702	6,138
2023	6,667	7,726	6,921	6,000	6,954	6,228
2024	6,667	8,036	7,036	6,000	7,232	6,332
2025	6,667	8,357	7,148	6,000	7,521	6,433
2026	6,667	8,691	7,257	6,000	7,822	6,531
2027	6,667	9,039	7,365	6,000	8,135	6,629
2028	6,667	9,400	7,473	6,000	8,460	6,726
2029	6,667	9,776	7,580	6,000	8,799	6,822
2030	6,667	10,167	7,685	6,000	9,151	6,917
2031	6,667	10,574	7,789	6,000	9,517	7,011
2032	6,667	10,997	7,893	6,000	9,897	7,103
2033	6,667	11,437	7,994	6,000	10,293	7,195
2034	6,667	11,895	8,095	6,000	10,705	7,285
2035	6,667	12,370	8,193	6,000	11,133	7,374
2036	6,667	12,865	8,290	6,000	11,579	7,461
2037	6,667	13,380	8,386	6,000	12,042	7,548
2038	6,667	13,915	8,482	6,000	12,523	7,633
2039	6,667	14,472	8,576	6,000	13,024	7,718
2040	6,667	15,050	8,669	6,000	13,545	7,802
2041	6,667	15,652	8,761	6,000	14,087	7,885
2042	6,667	16,278	8,851	6,000	14,651	7,966
2043	6,667	16,930	8,940	6,000	15,237	8,046
2044	6,667	17,607	9,028	6,000	15,846	8,125
2045	6,667	18,311	9,115	6,000	16,480	8,203
2046	6,667	19,044	9,200	6,000	17,139	8,280
2047	6,667	19,805	9,387	6,000	17,825	8,448
2048	6,667	20,597	9,474	6,000	18,538	8,527
2049	6,667	21,421	9,562	6,000	19,279	8,606
2050	6,667	22,278	9,652	6,000	20,050	8,686
2051	6,667	23,169	9,741	6,000	20,852	8,767
2052	6,667	24,096	9,832	6,000	21,687	8,849
2053	6,667	25,060	9,924	6,000	22,554	8,931
2054	6,667	26,062	10,016	6,000	23,456	9,015
2055	6,667	27,105	10,110	6,000	24,394	9,099
2056	6,667	28,189	10,204	6,000	25,370	9,183
2057	6,667	29,317	10,299	6,000	26,385	9,269
2058	6,667	30,489	10,395	6,000	27,440	9,355
2059	6,667	31,709	10,492	6,000	28,538	9,443
2060	6,667	32,977	10,589	6,000	29,680	9,530
2061	6,667	34,296	10,688	6,000	30,867	9,619
2062	6,667	35,668	10,788	6,000	32,101	9,709
2063	6,667	37,095	10,888	6,000	33,385	9,799
2064	6,667	38,579	10,990	6,000	34,721	9,891
2065	6,667	40,122	11,092	6,000	36,110	9,983
2066	6,667	41,727	11,195	6,000	37,554	10,076
2067	6,667	43,396	11,300	6,000	39,056	10,170
2068	6,667	45,132	11,405	6,000	40,618	10,264
2069	6,667	46,937	11,511	6,000	42,243	10,360
2070	6,667	48,814	11,618	6,000	43,933	10,457

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 2.3
Water Reclamation Expenditures

Calendar Year	Gross			Net		
	Expenditure	Inflated	Discounted	Expenditure	Inflated	Discounted
	(1)	(2)	(3)	(4)	(5)	(6)
2071	6,667	50,767	11,727	6,000	45,690	10,554
2072	6,667	52,798	11,836	6,000	47,518	10,652
2073	6,667	54,910	11,946	6,000	49,419	10,752
2074	6,667	57,106	12,057	6,000	51,395	10,852
2075	6,667	59,390	12,170	6,000	53,451	10,953
2076	6,667	61,766	12,283	6,000	55,589	11,055
2077	6,667	64,236	12,398	6,000	57,813	11,158
2078	6,667	66,806	12,513	6,000	60,125	11,262
2079	6,667	69,478	12,630	6,000	62,530	11,367
2080	6,667	72,257	12,747	6,000	65,031	11,473
2081	6,667	75,147	12,866	6,000	67,633	11,580
2082	6,667	78,153	12,986	6,000	70,338	11,687
2083	6,667	81,279	13,107	6,000	73,152	11,796
2084	6,667	84,531	13,229	6,000	76,078	11,906
2085	6,667	87,912	13,352	6,000	79,121	12,017
2086	6,667	91,428	13,477	6,000	82,286	12,129
2087	6,667	95,085	13,602	6,000	85,577	12,242
2088	6,667	98,889	13,729	6,000	89,000	12,356
2089	6,667	102,844	13,857	6,000	92,560	12,471
2090	6,667	106,958	13,986	6,000	96,262	12,587
2091	6,667	111,237	14,116	6,000	100,113	12,705
2092	6,667	115,686	14,248	6,000	104,117	12,823
2093	6,667	120,313	14,381	6,000	108,282	12,943
2094	6,667	125,126	14,515	6,000	112,613	13,063
Total	500,000	3,081,727	779,826	450,000	2,773,554	701,843

Footnotes:

(1) Exhibit 9.1 Row (25), spread over 75 years
Payments for future forfeitures delayed by three years to reflect period between forfeiture order and reclamation activity.

(2) Col (1) x annual inflation of…
0.0% for years 2017-18
3.0% for years 2019-20
3.5% for years 2021-22
4.0% for years 2023 & Subs

(3) Col (2) + Col (2) x Exhibit 8 Col (3)
Years 2046 and Subsequent based on 3.040% discount factor

(4) Exhibit 9.1 Row (27), spread over 75 years
Payments for future forfeitures delayed by three years to reflect period between forfeiture order and reclamation activity.

(5) Col (4) x annual inflation of…
0.0% for years 2017-18
3.0% for years 2019-20
3.5% for years 2021-22
4.0% for years 2023 & Subs

(6) Col (5) + Col (5) x Exhibit 8 Col (3)
Years 2046 and Subsequent based on 3.040% discount factor

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 3.1
Remaining Performance Security Requirement

Years Since Issuance	Active Pending Phase 1 Release	Final Map Pending Phase 1 Release	Pending Phase 2 Release	Pending Phase 3 Release
	(1)	(2)	(3)	(4)
1	100%	100%	50%	15%
2	100%	100%	50%	15%
3	100%	100%	50%	15%
4	100%	50%	50%	15%
5	100%	50%	50%	15%
6	100%	50%	50%	15%
7	100%	50%	15%	15%
8	50%	50%	15%	15%
9	50%	50%	15%	
10	50%	15%	15%	
11	50%	15%	15%	
12	50%	15%	15%	
13	50%	15%	15%	
14	15%	15%	15%	
15	15%	15%		
16	15%	15%		
17	15%	15%		
18	15%			
19	15%			
20	15%			
21	15%			

Footnotes:

(1) - (4) Judgmentally selected based on historic Ohio timing of various stages of the mining and reclamation process

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

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Exhibit 3.2

Reclamation Lifecycles

Evaluation	Final Map to Phase 1 release			Phase 1 release to Phase 2 release			Phase 2 release to Phase 3 release		
Year	Permit Count	Acres	Avg # Yrs	Permit Count	Acres	Avg # Yrs	Permit Count	Acres	Avg # Yrs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1999	115	5,470	1.9	129	7,117	3.9	147	5,961	6.5
2000	73	2,615	1.2	113	4,751	3.8	179	8,688	6.5
2001	91	7,671	1.7	117	7,640	3.6	162	6,844	6.9
2002	73	2,444	1.3	78	2,862	3.5	110	5,277	6.8
2003	87	4,840	2.6	62	2,603	3.7	105	4,800	7.2
2004	67	2,778	1.7	62	2,519	3.6	108	5,121	7.2
2005	70	3,357	1.2	50	2,415	3.3	73	2,519	6.0
2006	70	2,580	2.2	71	4,187	3.6	78	3,452	6.8
2007	53	2,216	1.6	61	2,675	4.2	81	3,125	7.8
2008	64	3,221	1.7	63	2,348	4.0	69	2,558	6.7
2009	40	2,030	1.8	57	1,852	5.2	50	2,358	8.5
2010	44	2,475	1.9	46	2,114	6.0	70	3,037	8.0
2011	54	2,285	3.4	68	3,181	4.3	73	3,081	7.0
2012	36	2,083	4.0	33	1,512	6.6	61	2,687	8.9
2013	112	7,090	3.8	72	4,005	7.3	82	4,037	8.9
2014	66	3,462	2.7	80	4,470	5.9	93	3,989	8.7
2015			2.9			5.9			7.8
Total	1,115	56,617		1,162	56,251		1,541	67,534	
Average	70	3,539	2.21	73	3,516	4.61	96	4,221	7.42
Selected			3.00			6.00			8.00

Footnotes:

Years 1999 through 2014	From the September 2014 Office of Surface Mining Reclamation and Enforcement report "A Report on the Success of Achieving Reclamation Standards on Surface Coal Mining Operations in Ohio" Table C "Timing and Acreage Released Over a 16-Year Period
Year 2015	From the September 2015 Office of Surface Mining Reclamation and Enforcement report "Annual Evaluation Summary Report Of the Regulatory and Abandoned Mine Land Programs" Page 19 through 22

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 4.1
Performance Security Estimate (PSE)

PSE	**Spring 2017**	*Spring 2015*	*Spring 2013*	*Spring 2011*	2017 vs. 2015	2017 vs. 2013	2017 vs. 2011
(1) Final Map PSE	**120,359,000**	*70,508,800*	*170,182,000*	*170,812,000*	49,850,200	(49,823,000)	(50,453,000)
(2) Active PSE	**464,529,000**	*537,158,580*	*529,266,142*	*396,722,889*	(72,629,580)	(64,737,142)	67,806,111
(3) Total PSE	**584,888,000**	*607,667,380*	*699,448,142*	*567,534,889*	(22,779,380)	(114,560,142)	17,353,111
(4) Bond Amount	**44,980,415**	*54,665,778*	*71,783,943*	*69,293,576*	(9,685,363)	(26,803,528)	(24,313,161)
(5) Total Net PSE	**539,907,585**	*553,001,601*	*627,664,199*	*498,241,313*	(13,094,016)	(87,756,614)	41,666,272

Footnotes:

(1), (2), (3), (5)	See report for details
(4)	Row (3) - Row (5)

Spring 2015, 2013 and 2011 Amounts from the Spring 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

SPRING 2017

Exhibit 4.2

Net Adjusted PSE by Mine Status

Phase	**Spring 2017**	*Spring 2015*	*Spring 2013*	*Spring 2011*	2017 vs. 2015	2017 vs. 2013	2017 vs. 2011
(1) Active - Pending Phase 1 release	**352,568,360**	*339,402,844*	*420,449,906*	*271,267,028*	13,165,516	(67,881,546)	81,301,332
(2) Active - Pending Phase 2 release	**55,821,286**	*131,073,897*	*30,432,476*	*61,646,604*	(75,252,611)	25,388,810	(5,825,318)
(3) Active - Pending Phase 3 release	**23,802,450**	*21,723,796*	*28,552,017*	*16,381,793*	2,078,654	(4,749,567)	7,420,657
(4) Active - Total	**432,192,096**	*492,200,537*	*479,434,399*	*349,295,425*	(60,008,441)	(47,242,303)	82,896,671
(5) Final Map - Pending Phase 1 release	**94,307,850**	*39,256,913*	*139,564,625*	*138,898,250*	55,050,937	(45,256,776)	(44,590,401)
(6) Final Map - Pending Phase 2 release	**11,302,513**	*10,811,000*	*6,455,063*	*7,838,688*	491,513	4,847,450	3,463,825
(7) Final Map - Pending Phase 3 release	**2,105,127**	*10,733,152*	*2,210,113*	*2,208,950*	(8,628,025)	(104,986)	(103,823)
(8) Final Map - Total	**107,715,489**	*60,801,065*	*148,229,800*	*148,945,888*	46,914,425	(40,514,311)	(41,230,399)
(9) Total Net Adjusted PSE	**539,907,585**	*553,001,601*	*627,664,199*	*498,241,313*	(13,094,016)	(87,756,614)	41,666,272

Footnotes:

(1) - (8)	See report for details
(9)	Row (4) + Row (8)

Spring 2015, 2013 and 2011 Amounts from the Spring 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 4.3
Average PSE

PSE Average	**Spring 2017**	*Spring 2015*	*Spring 2013*	*Spring 2011*	2017 vs. 2015	2017 vs. 2013	2017 vs. 2011
(1) Total PSE Per Permit Count	**3,481,476**	*3,232,273*	*3,108,658*	*2,384,600*	7.16%	10.71%	31.51%
(2) Net Adj PSE Per Permit Count	**3,213,736**	*2,941,498*	*2,789,619*	*2,093,451*	8.47%	13.20%	34.86%
(3) Total PSE Per Bonded Acre	**18,711**	*16,293*	*14,208*	*11,625*	12.92%	24.07%	37.87%
(4) Net Adj PSE Per Bonded Acre	**17,272**	*14,828*	*12,750*	*10,206*	14.15%	26.18%	40.91%
(5) Total PSE Per Permit Count w/ PSE > Bond	**4,397,654**	*3,452,656*	*3,346,642*	*2,782,034*	21.49%	23.90%	36.74%
(6) Net Adj PSE Per Permit Count w/ PSE > Bond	**4,059,456**	*3,142,055*	*3,003,178*	*2,442,359*	22.60%	26.02%	39.84%

Footnotes:

(1)	Exhibit 4.1 Row (3) / Exhibit 7.6a Col (9) Total
(2)	Exhibit 4.1 Row (5) / Exhibit 7.6a Col (9) Total
(3)	Exhibit 4.1 Row (3) / Exhibit 7.6b Col (9) Total
(4)	Exhibit 4.1 Row (5) / Exhibit 7.6b Col (9) Total
(5)	Exhibit 4.1 Row (3) / Exhibit 7.2 Col (9) Total
(6)	Exhibit 4.1 Row (5) / Exhibit 7.2 Col (9) Total

Spring 2015, 2013 and 2011 Amounts from the Spring 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 5.1
Forfeiture Rates

Years Since Issuance	All Permit Types (1)
1	0.00%
2	0.00%
3	0.50%
4	0.50%
5	0.50%
6	0.50%
7	0.50%
8	0.50%
9	0.50%
10	0.50%
11	0.50%
12	0.50%
13	0.50%
14	0.50%
15	0.50%
16	0.50%
17	0.50%
18	0.50%
19	0.50%
20	0.50%

Footnotes:
(1) Exhibit 5.2 Row (9)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 5.2
Forfeiture Rate Calculation

Calendar Year	Number of Permits In Force	Number of Permits Forfeited	Forfeiture Rate
	(1)	(2)	(3)
1993	799	17	2.13%
1994	775	6	0.77%
1995	722	27	3.74%
1996	683	4	0.59%
1997	579	4	0.69%
1998	568	4	0.70%
1999	563	17	3.02%
2000	456	2	0.44%
2001	389	4	1.03%
2002	363	1	0.28%
2003	357	3	0.84%
2004	356	1	0.28%
2005	338	8	2.37%
2006	329	0	0.00%
2007	321	0	0.00%
2008	308	0	0.00%
2009	290	0	0.00%
2010	266	0	0.00%
2011	252	0	0.00%
2012	246	0	0.00%
2013	229	0	0.00%
2014	224	6	2.68%
2015	220	0	0.00%
2016	209	0	0.00%
Total	9,842	104	1.06%

(4a) Average lifetime of permit	21.00
(4b) Selected average lifetime of permits w/o forfeitures	19.00
(5) Ohio indicated forfeiture annual incremental rate	0.06%
(6) Kentucky forfeiture annual incremental rate	0.99%
(7) West Virginia forfeiture annual incremental rate	1.08%
(8) Weighted indicated forfeiture annual incremental rate	0.50%
(9) Ohio selected forfeiture annual incremental rate	0.50%

Footnotes:

(1)	Historical Ohio permit data
(2)	Historical Ohio permit data
(3)	Col (2) / Col (1)
(4a)	Exhibit 3.1
(4b)	Selected average lifetime based on assumption of minimal forfeitures within the first two years of issuance
(5)	Col (3) / Row (4b)
(6)	From Pinnacle analysis of Kentucky data applied to Ohio permit count by mine type distribution
(7)	From Pinnacle analysis of West Virginia data applied to Ohio permit count by mine type distribution
(8)	Weighted average of rows (5) through (7) based on… OH = 60.0%, KY = 20.0% and WV = 20.0%
(9)	Selected based on rows (5) through (8)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 5.3
Forfeiture Rate Adjustment Factor for Mine Status

Mine Status	Factor
	(1)
Active, Pending Phase 1 Release	1.00
Final Map, Pending Phase 1 Release	0.80
Pending Phase 2 Release	0.67
Pending Phase 3 Release	0.33

Footnotes:

(1) Judgmentally selected

These factors are intended to reflect that the probability of forfeiture declines as the reclamation process moves from active mining to reclamation and on to final release.

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 6
Net Reclamation Cost by Mine Status

Phase	**Spring 2017**	*Spring 2015*	*Spring 2013*	*Spring 2011*	2017 vs. 2015	2017 vs. 2013	2017 vs. 2011
(1) Active - Pending Phase 1 release	**12,346,477**	*15,872,249*	*9,110,576*	*23,279,440*	(3,525,772)	3,235,901	(10,932,963)
(2) Active - Pending Phase 2 release	**1,103,194**	*3,800,171*	*339,359*	*1,491,776*	(2,696,978)	763,834	(388,582)
(3) Active - Pending Phase 3 release	**314,192**	*411,492*	*244,034*	*192,800*	(97,300)	70,158	121,392
(4) Active - Total	**13,763,863**	*20,083,913*	*9,693,970*	*24,964,016*	(6,320,049)	4,069,894	(11,200,152)
(5) Final Map - Pending Phase 1 release	**2,072,483**	*1,296,140*	*1,813,560*	*4,363,792*	776,344	258,924	(2,291,309)
(6) Final Map - Pending Phase 2 release	**225,312**	*319,172*	*71,130*	*201,678*	(93,860)	154,183	23,634
(7) Final Map - Pending Phase 3 release	**27,788**	*203,307*	*18,890*	*22,973*	(175,520)	8,898	4,814
(8) Final Map - Total	**2,325,583**	*1,818,619*	*1,903,579*	*4,588,444*	506,964	422,004	(2,262,860)
(9) Total Net Reclamation Cost	**16,089,447**	*21,902,532*	*11,597,549*	*29,552,459*	(5,813,085)	4,491,898	(13,463,013)

Footnotes:

(1), (2), (3), (5), (6), (7)	See report for details
(4)	Row (1) + Row (2) + Row (3)
(8)	Row (5) + Row (6) + Row (7)
(9)	Row (4) + Row (8)

Spring 2015, 2013 and 2011 Amounts from the Spring 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 7.1a
Permit Information by Parent Company

Parent Company	Total PSE	Net Adjusted PSE	Permit Count	Implied Bond Acres	Net Reclamation Cost
	(1)	(2)	(3)	(4)	(5)
MURRAY ENERGY	212,796,000	206,188,502	13	3,286	7,005,872
WESTMORELAND COAL COMPANY	150,070,000	131,764,000	63	14,888	4,259,358
CONSOL ENERGY	66,932,000	64,053,250	4	2,912	1,428,987
WATERLOO COAL CO INC	59,286,000	55,642,648	10	2,626	1,217,462
RHINO ENERGY, LLC	38,963,000	35,716,288	10	1,145	811,341
KIMBLE CLAY & LIMESTONE	13,635,000	11,133,300	13	1,112	438,756
ROSEBUD MINING COMPANY LLC	8,832,000	6,549,275	23	2,675	178,139
ANTHONY MINING CO INC	7,264,000	6,374,663	3	589	132,190
B & N COAL INC	6,776,000	5,078,875	6	449	128,631
SIDWELL MATERIALS INC	5,475,000	5,002,188	3	135	114,505
DTE DICKERSON LLC	4,905,000	3,881,500	1	83	131,645
THOMPSON BROTHERS MINING	2,183,000	1,934,400	4	112	44,042
ETTA MAE INC	1,973,000	1,881,563	1	124	37,590
AMERICAN LANDFILL INC	1,761,000	1,645,825	1	22	54,827
MARIETTA COAL COMPANY	1,276,000	1,195,250	2	86	43,557
VALLEY MINING INC	964,000	552,022	1	366	15,131
L & M MINERAL CO	894,000	760,250	2	51	35,755
SCHANEY MINING	305,000	295,000	1	13	5,963
STATE LINE RESOURCES INC	295,000	215,788	1	79	4,747
HERITAGE COAL CO LLC	159,000	0	1	384	0
F & M COAL CO	82,000	34,000	1	42	762
AMERIKOHL MINING INC	39,000	9,000	1	41	187
CHAMBERS DEVL OF OHIO INC	10,000	0	1	30	0
GEORGETOWN MARINE INC	10,000	0	1	4	0
COLLIER PORTS INC	3,000	0	1	6	0
Total	**584,888,000**	**539,907,585**	**168**	**31,259**	**16,089,447**
Spring 2015 Total	*607,667,380*	*553,001,601*	*188*	*37,295*	*21,902,532*
Spring 2013 Total	*699,448,142*	*627,664,199*	*225*	*49,229*	*11,597,549*
Spring 2011 Total	*567,534,889*	*498,241,313*	*238*	*48,820*	*29,552,459*
2017 vs. 2015	(22,779,380)	(13,094,016)	(20)	(6,037)	(5,813,085)
2017 vs. 2013	(114,560,142)	(87,756,614)	(57)	(17,971)	4,491,898
2017 vs. 2011	17,353,111	41,666,272	(70)	(17,561)	(13,463,013)

Footnotes:
(1), (2), (3), (4), (5) See report for details

Spring 2015, 2013 and 2011 Amounts from the Spring 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

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Exhibit 7.1b

Top Five Parent Companies

Parent Company	Net Adjusted PSE			Net Reclamation Cost		
	Amount	% of Total	Average	Amount	% of Total	Average
	(1)	(2)	(3)	(4)	(5)	(6)
MURRAY ENERGY	206,188,502	38.19%		7,005,872	43.54%	
WESTMORELAND COAL COMPANY	131,764,000	24.40%		4,259,358	26.47%	
CONSOL ENERGY	64,053,250	11.86%		1,428,987	8.88%	
WATERLOO COAL CO INC	55,642,648	10.31%		1,217,462	7.57%	
RHINO ENERGY, LLC	35,716,288	6.62%		811,341	5.04%	
Subtotal	493,364,688	91.38%	98,672,938	14,723,020	91.51%	2,944,604
Remaining Parent Companies	46,542,897	8.62%	2,908,931	1,366,426	8.49%	85,402
Total	**539,907,585**	**100.00%**	**25,709,885**	**16,089,447**	**100.00%**	**766,164**
Spring 2015 Total	*553,001,601*		*19,750,057*	*21,902,532*		*782,233*
Spring 2013 Total	*627,664,199*		*20,922,140*	*11,597,549*		*386,585*
Spring 2011 Total	*498,241,313*		*12,775,418*	*29,552,459*		*757,755*
2017 vs. 2015	(13,094,016)		23.18%	(5,813,085)		-2.10%
2017 vs. 2013	(87,756,614)		18.62%	4,491,898		49.54%
2017 vs. 2011	41,666,272		50.31%	(13,463,013)		1.10%

Footnotes:

(1) Exhibit 7.1a Col (2)

(2) Col (1) / Total Col (1)

(3) Derived from Exhibit 7.1a Col (2)

(4) Exhibit 7.1a Col (5)

(5) Col (4) / Total Col (4)

(6) Derived from Exhibit 7.1a Col (5)

Spring 2015, 2013 and 2011 Amounts from the Spring 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 7.1c
Parent Company Counts by PSE Range and Net Reclamation Cost Range

Net Adjusted PSE	Company Count	Net Reclamation Cost	Company Count
(1)	(2)	(3)	(4)
$0	4	$0	4
$0 to 100K	2	$0 to 10K	4
$100K to 1M	4	$10K to 100K	6
$1M to 2.5M	4	$100K to 500K	6
$2.5M to 5M	1	$500K to 1M	1
$5M to 9M	4	$1M to 2M	2
$9M to 25M	1	$2M to 5M	1
Over $25M	5	Over $5M	1
Total	**25**	**Total**	**25**

Footnotes:

(2)	Exhibit 7.1a Col (2)
(4)	Exhibit 7.1a Col (5)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

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Exhibit 7.2

Permits Counts with a Performance Security Estimate Greater Than Bond on Hand

Issue Year	Active				Final Map				Total
	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	1	1	0	0	0	0	1
1983	5	0	0	5	2	0	0	2	7
1984	7	0	0	7	1	0	0	1	8
1985	1	0	0	1	1	0	0	1	2
1986	0	0	0	0	0	0	0	0	0
1987	4	0	0	4	0	0	0	0	4
1988	1	1	0	2	0	0	0	0	2
1989	1	0	0	1	0	0	0	0	1
1990	0	0	0	0	0	0	0	0	0
1991	1	0	0	1	0	0	0	0	1
1992	1	1	1	3	1	0	0	1	4
1993	0	2	0	2	0	0	0	0	2
1994	2	1	1	4	0	0	0	0	4
1995	0	0	0	0	0	1	0	1	1
1996	1	0	0	1	0	2	0	2	3
1997	0	0	0	0	1	0	0	1	1
1998	1	0	0	1	3	2	0	5	6
1999	0	1	0	1	0	0	0	0	1
2000	0	0	0	0	1	0	0	1	1
2001	1	0	0	1	0	0	1	1	2
2002	0	0	0	0	0	2	0	2	2
2003	2	1	0	3	1	0	0	1	4
2004	4	0	0	4	1	1	1	3	7
2005	1	1	0	2	1	1	1	3	5
2006	5	0	0	5	1	1	0	2	7
2007	4	2	0	6	0	1	2	3	9
2008	2	0	0	2	1	2	3	6	8
2009	2	1	0	3	1	1	1	3	6
2010	1	0	0	1	0	3	0	3	4
2011	2	1	0	3	3	4	0	7	10
2012	4	0	0	4	1	3	1	5	9
2013	5	0	0	5	1	0	0	1	6
2014	4	0	0	4	0	0	0	0	4
2015	0	0	0	0	0	0	0	0	0
2016	1	0	0	1	0	0	0	0	1
Total	**63**	**12**	**3**	**78**	**21**	**24**	**10**	**55**	**133**
Spring 2015 Total	*96*	*26*	*4*	*126*	*9*	*13*	*28*	*50*	*176*
Spring 2013 Total	*107*	*9*	*6*	*122*	*31*	*26*	*30*	*87*	*209*
Spring 2011 Total				*119*				*85*	*204*
2017 vs. 2015	(33)	(14)	(1)	(48)	12	11	(18)	5	(43)
2017 vs. 2013	(44)	3	(3)	(44)	(10)	(2)	(20)	(32)	(76)
2017 vs. 2011				(41)				(30)	(71)

Footnotes:

(1) Client provided data, Pending Phase 1 Release
(2) Client provided data, Pending Phase 2 Release
(3) Client provided data, Pending Phase 3 Release
(4) Sum of Col (1) through Col (3)
(5) Client provided data, Pending Phase 1 Release
(6) Client provided data, Pending Phase 2 Release
(7) Client provided data, Pending Phase 3 Release
(8) Sum of Col (5) through Col (7)
(9) Col (4) + Col (8)

Spring 2015, 2013 and 2011 Amounts from the Spring 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

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Exhibit 7.3a

Permits Counts by Mine Status and Year of Issuance - Surface

Issue	Active				Final Map				Total
Year	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	0	0	0	0	0	0	0
1983	1	0	0	1	0	0	0	0	1
1984	1	0	0	1	0	0	0	0	1
1985	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0
1987	2	0	0	2	0	0	0	0	2
1988	1	0	0	1	0	1	0	1	2
1989	0	0	0	0	0	1	0	1	1
1990	0	0	0	0	0	0	0	0	0
1991	1	0	0	1	0	1	0	1	2
1992	1	1	1	3	1	0	0	1	4
1993	0	2	0	2	0	0	0	0	2
1994	2	1	1	4	0	0	0	0	4
1995	1	0	0	1	0	2	0	2	3
1996	1	0	0	1	0	2	0	2	3
1997	0	0	0	0	1	0	0	1	1
1998	3	0	0	3	2	2	0	4	7
1999	0	1	0	1	0	0	1	1	2
2000	0	0	0	0	1	1	0	2	2
2001	1	0	0	1	0	0	1	1	2
2002	0	0	0	0	0	2	0	2	2
2003	1	1	0	2	1	0	0	1	3
2004	3	0	0	3	1	1	2	4	7
2005	0	1	0	1	1	1	1	3	4
2006	5	0	0	5	1	2	0	3	8
2007	5	2	0	7	0	1	2	3	10
2008	2	0	0	2	1	3	3	7	9
2009	1	1	0	2	1	1	1	3	5
2010	1	0	0	1	0	4	0	4	5
2011	2	2	0	4	3	4	0	7	11
2012	4	0	0	4	1	4	1	6	10
2013	6	0	0	6	1	0	0	1	7
2014	7	0	0	7	0	0	0	0	7
2015	3	0	0	3	0	0	0	0	3
2016	3	0	0	3	0	0	0	0	3
Total	**58**	**12**	**2**	**72**	**16**	**33**	**12**	**61**	**133**
Spring 2015 Total	*76*	*25*	*4*	*105*	*4*	*19*	*28*	*51*	*156*
Spring 2013 Total	*89*	*7*	*5*	*101*	*30*	*34*	*30*	*94*	*195*
Spring 2011 Total				*103*				*104*	*207*
2017 vs. 2015	(18)	(13)	(2)	(33)	12	14	(16)	10	(23)
2017 vs. 2013	(31)	5	(3)	(29)	(14)	(1)	(18)	(33)	(62)
2017 vs. 2011				(31)				(43)	(74)

Permits Released Since Spring 2015	29
Total PSE of Permits Released Since Spring 2015	7,807,000
Net Adjusted PSE of Permits Released Since Spring 2015	5,373,843

Permits Issued Since Spring 2015	7
Total PSE of Permits Issued Since Spring 2015	5,046,000
Net Adjusted PSE of Permits Issued Since Spring 2015	4,106,625

Permits remaining in system from Spring 2015 to Spring 2017	126
Total PSE change of permits remaining in system from Spring 2015 to Spring 2017	(152,585,292)
Net Adjusted PSE change of permits remaining in system from Spring 2015 to Spring 2017	(144,674,241)

Footnotes:

(1) Client provided data, Pending Phase 1 Release
(2) Client provided data, Pending Phase 2 Release
(3) Client provided data, Pending Phase 3 Release
(4) Sum of Col (1) through Col (3)
(5) Client provided data, Pending Phase 1 Release
(6) Client provided data, Pending Phase 2 Release
(7) Client provided data, Pending Phase 3 Release
(8) Sum of Col (5) through Col (7)
(9) Col (4) + Col (8)

Spring 2015, 2013 and 2011 Amounts from the Spring 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

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Exhibit 7.3b

Implied Bonded Acres by Mine Status and Year of Issuance - Surface

Issue	Active				Final Map				Total
Year	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	0	0	0	0	0	0	0
1983	75	0	0	75	0	0	0	0	75
1984	41	0	0	41	0	0	0	0	41
1985	0	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	0	0	0	0
1987	69	109	156	334	0	0	0	0	334
1988	149	0	0	149	0	40	58	98	247
1989	0	0	0	0	0	83	119	203	203
1990	0	0	0	0	0	0	0	0	0
1991	35	0	0	35	0	113	162	275	310
1992	3	123	217	343	13	19	91	124	467
1993	0	12	27	40	0	0	0	0	40
1994	13	78	299	389	0	0	0	0	389
1995	30	0	0	30	0	224	385	608	638
1996	32	0	0	32	0	341	564	905	937
1997	0	0	0	0	0	0	150	150	150
1998	176	323	461	960	128	558	1,016	1,701	2,661
1999	0	3	60	62	0	0	101	101	163
2000	0	0	0	0	4	34	58	96	96
2001	24	123	176	323	0	0	52	52	375
2002	0	0	0	0	0	31	63	94	94
2003	24	9	13	46	16	366	523	905	952
2004	54	138	226	418	10	18	411	439	857
2005	0	7	88	96	0	12	554	566	662
2006	264	732	1,172	2,168	19	292	451	763	2,931
2007	349	603	1,279	2,231	0	160	951	1,112	3,343
2008	163	696	1,188	2,047	2	406	1,232	1,640	3,687
2009	29	131	241	401	0	274	511	785	1,186
2010	9	13	18	40	0	135	254	389	429
2011	108	411	587	1,105	141	677	967	1,784	2,889
2012	87	96	217	399	22	342	604	968	1,367
2013	206	7	9	222	55	76	109	240	462
2014	330	68	98	496	0	0	0	0	496
2015	12	0	0	12	0	0	0	0	12
2016	12	0	0	12	0	0	0	0	12
Total	**2,295**	**3,680**	**6,530**	**12,505**	**411**	**4,202**	**9,384**	**13,997**	**26,502**
Spring 2015 Total	*2,736*	*6,913*	*12,157*	*21,806*	*213*	*2,108*	*8,124*	*10,444*	*32,251*
Spring 2013 Total	*3,744*	*5,903*	*10,283*	*19,931*	*1,723*	*6,762*	*15,465*	*23,950*	*43,881*
Spring 2011 Total				*18,571*				*23,585*	*42,157*
2017 vs. 2015	(441)	(3,232)	(5,627)	(9,301)	198	2,095	1,260	3,553	(5,748)
2017 vs. 2013	(1,449)	(2,223)	(3,753)	(7,425)	(1,312)	(2,560)	(6,081)	(9,953)	(17,379)
2017 vs. 2011				(6,066)				(9,588)	(15,654)

Acres Released Since Spring 2015	3,633

Acres Issued Since Spring 2015	220

Footnotes:

(1) Client provided data, Pending Phase 1 Release
(2) Client provided data, Pending Phase 2 Release
(3) Client provided data, Pending Phase 3 Release
(4) Sum of Col (1) through Col (3)
(5) Client provided data, Pending Phase 1 Release
(6) Client provided data, Pending Phase 2 Release
(7) Client provided data, Pending Phase 3 Release
(8) Sum of Col (5) through Col (7)
(9) Col (4) + Col (8)

Spring 2015, 2013 and 2011 Amounts from the Spring 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

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Exhibit 7.4a

Permits Counts by Mine Status and Year of Issuance - Underground

Issue Year	Active				Final Map				Total
	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0
1984	3	0	0	3	3	0	0	3	6
1985	0	0	0	0	1	0	0	1	1
1986	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	1	0	0	1	1
1999	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0
2004	1	0	0	1	0	0	0	0	1
2005	1	0	0	1	0	0	0	0	1
2006	1	0	0	1	0	0	0	0	1
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0
2012	1	0	0	1	0	0	0	0	1
2013	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0
2015	2	0	0	2	0	0	0	0	2
2016	1	0	0	1	0	0	0	0	1
Total	**10**	**0**	**0**	**10**	**5**	**0**	**0**	**5**	**15**
Spring 2015 Total	*7*	*0*	*0*	*7*	*5*	*0*	*0*	*5*	*12*
Spring 2013 Total	*7*	*1*	*0*	*8*	*4*	*0*	*0*	*4*	*12*
Spring 2011 Total				*8*				*5*	*13*
2017 vs. 2015	3	0	0	3	0	0	0	0	3
2017 vs. 2013	3	(1)	0	2	1	0	0	1	3
2017 vs. 2011				2				0	2

Permits Released Since Spring 2015	1
Total PSE of Permits Released Since Spring 2015	21,000
Net Adjusted PSE of Permits Released Since Spring 2015	16,750

Permits Issued Since Spring 2015	3
Total PSE of Permits Issued Since Spring 2015	1,541,000
Net Adjusted PSE of Permits Issued Since Spring 2015	1,511,000

Permits remaining in system from Spring 2015 to Spring 2017	12
Total PSE change of permits remaining in system from Spring 2015 to Spring 2017	128,334,971
Net Adjusted PSE change of permits remaining in system from Spring 2015 to Spring 2017	128,611,346

Footnotes:

(1) Client provided data, Pending Phase 1 Release
(2) Client provided data, Pending Phase 2 Release
(3) Client provided data, Pending Phase 3 Release
(4) Sum of Col (1) through Col (3)
(5) Client provided data, Pending Phase 1 Release
(6) Client provided data, Pending Phase 2 Release
(7) Client provided data, Pending Phase 3 Release
(8) Sum of Col (5) through Col (7)
(9) Col (4) + Col (8)

Spring 2015, 2013 and 2011 Amounts from the Spring 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

SPRING 2017

Exhibit 7.4b

Implied Bonded Acres by Mine Status and Year of Issuance - Underground

Issue	Active				Final Map				Total
Year	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	0	0	0	0	0	0	0
1983	0	0	0	0	0	0	0	0	0
1984	124	51	73	247	475	914	1,306	2,695	2,942
1985	0	0	0	0	8	204	291	502	502
1986	0	0	0	0	0	0	0	0	0
1987	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	33	49	70	153	153
1999	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0
2004	79	0	0	79	0	0	0	0	79
2005	28	39	56	123	0	0	0	0	123
2006	45	0	0	45	0	0	0	0	45
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0
2012	32	0	0	32	0	0	0	0	32
2013	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0
2015	8	0	0	8	0	0	0	0	8
2016	4	0	0	4	0	0	0	0	4
Total	**321**	**90**	**128**	**539**	**516**	**1,167**	**1,667**	**3,350**	**3,889**
Spring 2015 Total	*286*	*60*	*86*	*432*	*509*	*1,155*	*1,650*	*3,314*	*3,745*
Spring 2013 Total	*792*	*60*	*85*	*937*	*483*	*1,118*	*1,597*	*3,197*	*4,134*
Spring 2011 Total				*480*				*4,873*	*5,353*
2017 vs. 2015	34	30	43	107	7	12	17	36	144
2017 vs. 2013	(471)	30	43	(398)	33	49	70	153	(245)
2017 vs. 2011				59				(1,523)	(1,464)

Acres Released Since Spring 2015	116

Acres Issued Since Spring 2015	12

Footnotes:

(1) Client provided data, Pending Phase 1 Release
(2) Client provided data, Pending Phase 2 Release
(3) Client provided data, Pending Phase 3 Release
(4) Sum of Col (1) through Col (3)
(5) Client provided data, Pending Phase 1 Release
(6) Client provided data, Pending Phase 2 Release
(7) Client provided data, Pending Phase 3 Release
(8) Sum of Col (5) through Col (7)
(9) Col (4) + Col (8)

Spring 2015, 2013 and 2011 Amounts from the Spring 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

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Exhibit 7.5a

Permits Counts by Mine Status and Year of Issuance - Facility Operations

Issue Year	Active				Final Map				Total
	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	1	1	0	0	0	0	1
1983	4	0	0	4	2	0	0	2	6
1984	3	0	0	3	0	0	0	0	3
1985	1	0	0	1	0	0	0	0	1
1986	0	0	0	0	0	0	0	0	0
1987	2	0	0	2	0	0	0	0	2
1988	0	1	0	1	0	0	0	0	1
1989	1	0	0	1	0	0	0	0	1
1990	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0
2003	1	0	0	1	0	0	0	0	1
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	1	0	0	1	0	0	0	0	1
2010	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0
2013	1	0	0	1	0	0	0	0	1
2014	1	0	0	1	0	0	0	0	1
2015	1	0	0	1	0	0	0	0	1
2016	0	0	0	0	0	0	0	0	0
Total	**16**	**1**	**1**	**18**	**2**	**0**	**0**	**2**	**20**
Spring 2015 Total	*16*	*1*	*1*	*18*	*2*	*0*	*0*	*2*	*20*
Spring 2013 Total	*14*	*1*	*1*	*16*	*2*	*0*	*0*	*2*	*18*
Spring 2011 Total				*16*				*2*	*18*
2017 vs. 2015	0	0	0	0	0	0	0	0	0
2017 vs. 2013	2	0	0	2	0	0	0	0	2
2017 vs. 2011				2				0	2

Permits Released Since Spring 2015	1
Total PSE of Permits Released Since Spring 2015	2,526,000
Net Adjusted PSE of Permits Released Since Spring 2015	2,449,000

Permits Issued Since Spring 2015	1
Total PSE of Permits Issued Since Spring 2015	10,000
Net Adjusted PSE of Permits Issued Since Spring 2015	0

Permits remaining in system from Spring 2015 to Spring 2017	19
Total PSE change of permits remaining in system from Spring 2015 to Spring 2017	4,718,973
Net Adjusted PSE change of permits remaining in system from Spring 2015 to Spring 2017	5,190,848

Footnotes:

(1) Client provided data, Pending Phase 1 Release
(2) Client provided data, Pending Phase 2 Release
(3) Client provided data, Pending Phase 3 Release
(4) Sum of Col (1) through Col (3)
(5) Client provided data, Pending Phase 1 Release
(6) Client provided data, Pending Phase 2 Release
(7) Client provided data, Pending Phase 3 Release
(8) Sum of Col (5) through Col (7)
(9) Col (4) + Col (8)

Spring 2015, 2013 and 2011 Amounts from the Spring 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

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Exhibit 7.5b

Implied Bonded Acres by Mine Status and Year of Issuance - Facility Operations

Issue	Active				Final Map				Total
Year	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	4	4	0	0	0	0	4
1983	84	26	38	148	35	58	85	178	326
1984	57	8	11	76	0	0	0	0	76
1985	0	31	45	76	0	0	0	0	76
1986	0	0	0	0	0	0	0	0	0
1987	25	0	0	25	0	0	0	0	25
1988	0	31	47	78	0	0	0	0	78
1989	11	0	0	11	0	0	0	0	11
1990	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0
2003	8	0	0	8	0	0	0	0	8
2004	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	133	0	0	133	0	0	0	0	133
2010	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0
2013	101	0	0	101	0	0	0	0	101
2014	27	0	0	27	0	0	0	0	27
2015	4	0	0	4	0	0	0	0	4
2016	0	0	0	0	0	0	0	0	0
Total	**448**	**97**	**144**	**690**	**35**	**58**	**85**	**178**	**867**
Spring 2015 Total	*416*	*123*	*184*	*724*	*131*	*183*	*262*	*576*	*1,300*
Spring 2013 Total	*388*	*78*	*117*	*582*	*131*	*183*	*318*	*632*	*1,214*
Spring 2011 Total				*678*				*632*	*1,310*
2017 vs. 2015	32	(27)	(40)	(34)	(96)	(125)	(177)	(398)	(432)
2017 vs. 2013	61	19	27	107	(96)	(125)	(233)	(454)	(347)
2017 vs. 2011				11				(454)	(443)

Acres Released Since Spring 2015	68

Acres Issued Since Spring 2015	4

Footnotes:

(1) Client provided data, Pending Phase 1 Release
(2) Client provided data, Pending Phase 2 Release
(3) Client provided data, Pending Phase 3 Release
(4) Sum of Col (1) through Col (3)
(5) Client provided data, Pending Phase 1 Release
(6) Client provided data, Pending Phase 2 Release
(7) Client provided data, Pending Phase 3 Release
(8) Sum of Col (5) through Col (7)
(9) Col (4) + Col (8)

Spring 2015, 2013 and 2011 Amounts from the Spring 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

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Exhibit 7.6a

Permits Counts by Mine Status and Year of Issuance - Total

Issue	Active				Final Map				Total
Year	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	1	1	0	0	0	0	1
1983	5	0	0	5	2	0	0	2	7
1984	7	0	0	7	3	0	0	3	10
1985	1	0	0	1	1	0	0	1	2
1986	0	0	0	0	0	0	0	0	0
1987	4	0	0	4	0	0	0	0	4
1988	1	1	0	2	0	1	0	1	3
1989	1	0	0	1	0	1	0	1	2
1990	0	0	0	0	0	0	0	0	0
1991	1	0	0	1	0	1	0	1	2
1992	1	1	1	3	1	0	0	1	4
1993	0	2	0	2	0	0	0	0	2
1994	2	1	1	4	0	0	0	0	4
1995	1	0	0	1	0	2	0	2	3
1996	1	0	0	1	0	2	0	2	3
1997	0	0	0	0	1	0	0	1	1
1998	3	0	0	3	3	2	0	5	8
1999	0	1	0	1	0	0	1	1	2
2000	0	0	0	0	1	1	0	2	2
2001	1	0	0	1	0	0	1	1	2
2002	0	0	0	0	0	2	0	2	2
2003	2	1	0	3	1	0	0	1	4
2004	4	0	0	4	1	1	2	4	8
2005	1	1	0	2	1	1	1	3	5
2006	6	0	0	6	1	2	0	3	9
2007	5	2	0	7	0	1	2	3	10
2008	2	0	0	2	1	3	3	7	9
2009	2	1	0	3	1	1	1	3	6
2010	1	0	0	1	0	4	0	4	5
2011	2	2	0	4	3	4	0	7	11
2012	5	0	0	5	1	4	1	6	11
2013	7	0	0	7	1	0	0	1	8
2014	8	0	0	8	0	0	0	0	8
2015	6	0	0	6	0	0	0	0	6
2016	4	0	0	4	0	0	0	0	4
Total	**84**	**13**	**3**	**100**	**23**	**33**	**12**	**68**	**168**
Spring 2015 Total	*99*	*26*	*5*	*130*	*11*	*19*	*28*	*58*	*188*
Spring 2013 Total	*110*	*9*	*6*	*125*	*36*	*34*	*30*	*100*	*225*
Spring 2011 Total				*127*				*111*	*238*
2017 vs. 2015	(15)	(13)	(2)	(30)	12	14	(16)	10	(20)
2017 vs. 2013	(26)	4	(3)	(25)	(13)	(1)	(18)	(32)	(57)
2017 vs. 2011				(27)				(43)	(70)

Permits Released Since Spring 2015	31
Total PSE of Permits Released Since Spring 2015	9,845,031
Net Adjusted PSE of Permits Released Since Spring 2015	7,839,593

Permits Issued Since Spring 2015	11
Total PSE of Permits Issued Since Spring 2015	6,597,000
Net Adjusted PSE of Permits Issued Since Spring 2015	5,617,625

Permits remaining in system from Spring 2015 to Spring 2017	157
Total PSE change of permits remaining in system from Spring 2015 to Spring 2017	(19,531,349)
Net Adjusted PSE change of permits remaining in system from Spring 2015 to Spring 2017	(10,872,048)

Footnotes:

(1) Sum of Exhibits 7.3a through 7.5a Col (1), Pending Release
(2) Sum of Exhibits 7.3a through 7.5a Col (2), Pending Release
(3) Sum of Exhibits 7.3a through 7.5a Col (3), Pending Release
(4) Sum of Col (1) through Col (3)
(5) Sum of Exhibits 7.3a through 7.5a Col (5), Pending Release
(6) Sum of Exhibits 7.3a through 7.5a Col (6), Pending Release
(7) Sum of Exhibits 7.3a through 7.5a Col (7), Pending Release
(8) Sum of Col (5) through Col (7)
(9) Col (4) + Col (8)

Spring 2015, 2013 and 2011 Amounts from the Spring 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS

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Exhibit 7.6b

Implied Bonded Acres by Mine Status and Year of Issuance - Total

Issue	Active				Final Map				Total
Year	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1982	0	0	4	4	0	0	0	0	4
1983	159	26	38	223	35	58	85	178	401
1984	222	58	83	364	475	914	1,306	2,695	3,058
1985	0	31	45	76	8	204	291	502	579
1986	0	0	0	0	0	0	0	0	0
1987	94	109	156	359	0	0	0	0	359
1988	149	31	47	227	0	40	58	98	325
1989	11	0	0	11	0	83	119	203	214
1990	0	0	0	0	0	0	0	0	0
1991	35	0	0	35	0	113	162	275	310
1992	3	123	217	343	13	19	91	124	467
1993	0	12	27	40	0	0	0	0	40
1994	13	78	299	389	0	0	0	0	389
1995	30	0	0	30	0	224	385	608	638
1996	32	0	0	32	0	341	564	905	937
1997	0	0	0	0	0	0	150	150	150
1998	176	323	461	960	161	607	1,086	1,854	2,813
1999	0	3	60	62	0	0	101	101	163
2000	0	0	0	0	4	34	58	96	96
2001	24	123	176	323	0	0	52	52	375
2002	0	0	0	0	0	31	63	94	94
2003	32	9	13	54	16	366	523	905	959
2004	133	138	226	497	10	18	411	439	936
2005	28	46	144	219	0	12	554	566	785
2006	310	732	1,172	2,213	19	292	451	763	2,976
2007	349	603	1,279	2,231	0	160	951	1,112	3,343
2008	163	696	1,188	2,047	2	406	1,232	1,640	3,687
2009	162	131	241	533	0	274	511	785	1,318
2010	9	13	18	40	0	135	254	389	429
2011	108	411	587	1,105	141	677	967	1,784	2,889
2012	120	96	217	432	22	342	604	968	1,400
2013	307	7	9	323	55	76	109	240	563
2014	357	68	98	523	0	0	0	0	523
2015	24	0	0	24	0	0	0	0	24
2016	16	0	0	16	0	0	0	0	16
Total	**3,064**	**3,867**	**6,803**	**13,734**	**961**	**5,427**	**11,136**	**17,525**	**31,259**
Spring 2015 Total	*3,439*	*7,096*	*12,427*	*22,962*	*853*	*3,446*	*10,035*	*14,334*	*37,295*
Spring 2013 Total	*4,923*	*6,041*	*10,486*	*21,449*	*2,337*	*8,063*	*17,380*	*27,780*	*49,229*
Spring 2011 Total				*19,729*				*29,091*	*48,820*
2017 vs. 2015	(375)	(3,229)	(5,624)	(9,228)	109	1,982	1,101	3,191	(6,037)
2017 vs. 2013	(1,859)	(2,173)	(3,683)	(7,716)	(1,375)	(2,636)	(6,244)	(10,255)	(17,971)
2017 vs. 2011				(5,995)				(11,566)	(17,561)

Acres Released Since Spring 2015	3,817

Acres Issued Since Spring 2015	236

Footnotes:

(1) Sum of Exhibits 7.3b through 7.5b Col (1), Pending Release

(2) Sum of Exhibits 7.3b through 7.5b Col (2), Pending Release

(3) Sum of Exhibits 7.3b through 7.5b Col (3), Pending Release

(4) Sum of Col (1) through Col (3)

(5) Sum of Exhibits 7.3b through 7.5b Col (5), Pending Release

(6) Sum of Exhibits 7.3b through 7.5b Col (6), Pending Release

(7) Sum of Exhibits 7.3b through 7.5b Col (7), Pending Release

(8) Sum of Col (5) through Col (7)

(9) Col (4) + Col (8)

Spring 2015, 2013 and 2011 Amounts from the Spring 2015, 2013 and 2011 Reports by Pinnacle

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 8
Projected Investment Rates
Based on US Treasury Returns in Spring 2017

Calendar Year	Investment Return (%)	Yearly Discount Factor	Compound Discount Factor
	(1)	(2)	(3)
2017	**0.830%**	99.177%	-0.412%
2018	**1.220%**	98.795%	-1.613%
2019	**1.500%**	98.522%	-3.067%
2020	1.720%	98.309%	-4.706%
2021	**1.930%**	98.107%	-6.510%
2022	2.090%	97.953%	-8.424%
2023	**2.240%**	97.809%	-10.430%
2024	2.300%	97.752%	-12.444%
2025	2.370%	97.685%	-14.471%
2026	**2.430%**	97.628%	-16.500%
2027	2.470%	97.590%	-18.513%
2028	2.500%	97.561%	-20.501%
2029	2.540%	97.523%	-22.470%
2030	2.570%	97.494%	-24.412%
2031	2.610%	97.456%	-26.335%
2032	2.640%	97.428%	-28.230%
2033	2.680%	97.390%	-30.103%
2034	2.710%	97.362%	-31.947%
2035	2.750%	97.324%	-33.769%
2036	**2.780%**	97.295%	-35.560%
2037	2.810%	97.267%	-37.321%
2038	2.830%	97.248%	-39.046%
2039	2.860%	97.220%	-40.741%
2040	2.880%	97.201%	-42.400%
2041	2.910%	97.172%	-44.029%
2042	2.940%	97.144%	-45.627%
2043	2.960%	97.125%	-47.190%
2044	2.990%	97.097%	-48.724%
2045	3.010%	97.078%	-50.222%
2046	**3.040%**	97.050%	-51.691%

Footnotes:

(1) Based on US Treasury Returns in Spring 2017; Returns not in **Bold** are interpolated from US Treasury Rates

(2), (3) Based on Col (1)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
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Exhibit 9.1
Water Reclamation Cost

		Surface	Underground	Other	Total
Acres	(1) Permitted acres with water treatment	0	1,633	0	1,633
	(2) Permitted acres with water monitoring	0	0	395	395
	(3) Percent of monitored permits that become water treatment	5.00%	5.00%	5.00%	
	(4) Projected permitted acres with water treatment	0	1,633	20	1,652
Average Cost	(5) Water capital Ohio permit #433 avg cost per *affected* acre		13.36		
	(6) Water treatment Ohio permit #433 avg cost per *affected* acre		318.36		
	(7) Water capital West Virginia avg cost per permitted acre	11.94	54.91	42.68	
	(8) Water treatment West Virginia avg cost per permitted acre	6.91	241.40	180.88	
Selected	(9) Water capital selected avg cost per permitted acre	11.94	54.91	42.68	
Average Cost	(10) Water treatment selected avg cost per permitted acre	6.91	241.40	180.88	
Number of	(11) Number of years for water capital reclamation	75	75	75	
Exposure Years	(12) Number of years for water treatment reclamation	75	75	75	
Forfeiture Rate	(13) Selected water forfeiture rate	0.50%	0.50%	0.50%	
Estimate 1	(14) Water capital reclamation cost	0	33,615	316	33,931
Gross	(15) Water treatment reclamation cost	0	147,779	1,340	149,119
Reclamation Cost	(16) Estimate 1 - Total gross water reclamation cost	0	181,394	1,656	183,050
Estimate 2	(17) Estimated water treatment cost for Ohio permit #201501				2,851,602
Gross	(18) Number of Ohio permits in the fund with water treatment and monitoring				5
Reclamation Cost	(19) Number of Ohio full cost permits with water treatment				1
	(20) Total number of Ohio permits in the fund (Active + Final Map)				168
	(21) Ratio of water issue permits to total permits				3.57%
	(22) Selected ratio of water issue permits to total permits				5.00%
	(23) Estimate 2 - Total gross water reclamation cost				142,580
Estimate 3	(24a) Pinnacle's 2013 Ohio analysis selected gross water reclamation cost				2,500,000
Gross	(24b) Pinnacle's 2015 Ohio analysis selected gross water reclamation cost				2,250,000
Reclamation Cost	(25) Selected gross water reclamation cost				500,000
Net	(26) Water Trust Fund mitigation adjustment percentage				10%
Reclamation Cost	(27) Total estimated net water reclamation cost				450,000

Footnotes:

(1), (2)	Provided by Client
(3)	Judgmental Selection (The two permits being monitored have a minimal probability of developing into long term water treatment)
(4)	Row (1) + Row (2) x Row (3)
(5), (6)	From 2015 Pinnacle Report
(7), (8)	Internal Analysis of West Virginia Data, treatment costs adjusted for pre 2011 NPDES standards
(9)	Row (7)
(10)	Row (8)
(11), (12)	Based on Client estimates.
(13)	Judgmental Selection. Equals the selected land reclamation forfeiture rate in Exhibit 5.2 Row (9)
(14)	Row (4) x Row (9) x Row (11) x Row (13)
(15)	Row (4) x Row (10) x Row (12) x Row (13)
(16)	Row (14) + Row (15)
(17)	Client provided data
(18)	Exhibit 9.2a and Exhibit 9.2b
(19)	Client provided data
(20)	Exhibit 7.6a Col (9)
(21)	[Row (18) + Row (19)] / Row(20)
(22)	Judgmental Selection based on Row (21)
(23)	Row (21) x Row (22)
(24)	Selection from the Prior Ohio analysis (2013 Pinnacle Report and 2015 Pinnacle Report)
(25)	Selection based on Row (16), Row (23), and Row (24)
(26)	Judgmental Selection, considering forfeitures before Trust is set up or while Trust is partially funded by the RFF.
(27)	Row (25) x [1.00 - Row (26)]

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 9.2a
Water Reclamation Cost

Ohio Permits with Water Treatment

		Surface	Underground	Other
	Water Capital Cost per Year		N/A	
Permit #	Water Treatment Cost per Year		N/A	
354	Permitted Acres		997	
Issue Yr.	Affected Acres			
1984	Implied Bonded Acres		1,796	
Underground	Total PSE		64,740,000	
	Net Adjusted PSE		62,754,625	
	Water Capital Cost per Year		N/A	
Permit #	Water Treatment Cost per Year		N/A	
355	Permitted Acres		316	
Issue Yr.	Affected Acres			
1984	Implied Bonded Acres		514	
Underground	Total PSE		398,000	
	Net Adjusted PSE		0	
	Water Capital Cost per Year		N/A	
Permit #	Water Treatment Cost per Year		N/A	
463	Permitted Acres		319	
Issue Yr.	Affected Acres			
1985	Implied Bonded Acres		502	
Underground	Total PSE		1,480,000	
	Net Adjusted PSE		1,097,125	

Data provided by Client

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 9.2b
Water Reclamation Cost

Ohio Permits Being Monitored For Possible Water Treatment

		Surface	Underground	Other
Permit #	Permitted Acres			344
215	Affected Acres			
Issue Yr.	Implied Bonded Acres			99
1983	Total PSE			314,000
Facility Operations	Net Adjusted PSE			201,500
Permit #	Permitted Acres			52
223	Affected Acres			
Issue Yr.	Implied Bonded Acres			79
1983	Total PSE			295,000
Facility Operations	Net Adjusted PSE			215,788

Data provided by client.

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 2.2
Land Reclamation Expenditures

Calendar Year	Gross			Net		
	Expenditure	Inflated	Discounted	Expenditure	Inflated	Discounted
	(1)	(2)	(3)	(4)	(5)	(6)
2016						
2017	**2,225,580**	2,225,580	2,216,401	**2,225,580**	2,225,580	2,216,401
2018	**2,452,499**	2,452,499	2,412,946	**2,452,499**	2,452,499	2,412,946
2019	**1,110,589**	1,127,125	1,092,559	**1,110,589**	1,127,125	1,092,559
2020	1,394,448	1,457,666	1,389,071	1,292,985	1,351,604	1,288,000
2021	1,394,648	1,505,252	1,407,257	1,292,985	1,395,527	1,304,675
2022	1,399,818	1,563,711	1,431,982	1,298,022	1,449,996	1,327,847
2023	1,336,154	1,548,561	1,387,038	1,237,992	1,434,794	1,285,138
2024	1,336,154	1,610,503	1,410,088	1,237,992	1,492,186	1,306,495
2025	1,336,154	1,674,923	1,432,540	1,237,992	1,551,873	1,327,297
2026	943,382	1,229,870	1,026,938	879,365	1,146,413	957,251
2027	488,584	662,436	539,799	452,668	613,741	500,119
2028	343,073	483,755	384,583	320,378	451,754	359,142
2029	303,985	445,783	345,617	283,521	415,774	322,351
2030	303,985	463,614	350,435	283,521	432,405	326,845
2031	303,985	482,159	355,182	283,521	449,702	331,272
2032	303,985	501,445	359,888	283,521	467,690	335,662
2033	108,729	186,531	130,380	100,331	172,123	120,309
2034	40,631	72,492	49,333	38,152	68,070	46,323
2035	40,631	75,392	49,933	38,152	70,793	46,887
2036	40,631	78,408	50,526	38,152	73,624	47,443
2037	33,853	67,942	42,585	31,762	63,744	39,954
2038	33,853	70,660	43,070	31,762	66,294	40,409
2039	33,853	73,486	43,547	31,762	68,946	40,857
2040	33,853	76,426	44,021	31,762	71,704	41,301
Total	17,343,055	20,136,221	17,995,721	16,514,966	19,113,960	17,117,483

Footnotes:

(1) See report for details.
Years 2017-2019 reflect current reclamation projects
Payments for future forfeitures delayed by three years to reflect period between forfeiture order and reclamation activity.

(2) Col (1) x annual inflation of…
0.0% for years 2017-18
3.0% for years 2019-20
3.5% for years 2021-22
4.0% for years 2023 & Subs

(3) Col (2) + Col (2) x Exhibit 8 Col (3)

(4) See report for details
Years 2017-2019 reflect current reclamation projec
Payments for future forfeitures delayed by three years to reflect period between forfeiture order and reclamation activity.

(5) Col (4) x annual inflation of…
0.0% for years 2017-18
3.0% for years 2019-20
3.5% for years 2021-22
4.0% for years 2023 & Subs

(6) Col (5) + Col (5) x Exhibit 8 Col (3)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 5.1
Forfeiture Rates

Years Since Issuance	All Permit Types (1)
1	0.00%
2	0.00%
3	0.33%
4	0.33%
5	0.33%
6	0.33%
7	0.33%
8	0.33%
9	0.33%
10	0.33%
11	0.33%
12	0.33%
13	0.33%
14	0.33%
15	0.33%
16	0.33%
17	0.33%
18	0.33%
19	0.33%
20	0.33%

Footnotes:
(1) Exhibit 5.2 Row (9)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 5.2
Forfeiture Rate Calculation

Calendar Year	Number of Permits In Force	Number of Permits Forfeited	Forfeiture Rate
	(1)	(2)	(3)
1993	799	17	2.13%
1994	775	6	0.77%
1995	722	27	3.74%
1996	683	4	0.59%
1997	579	4	0.69%
1998	568	4	0.70%
1999	563	17	3.02%
2000	456	2	0.44%
2001	389	4	1.03%
2002	363	1	0.28%
2003	357	3	0.84%
2004	356	1	0.28%
2005	338	8	2.37%
2006	329	0	0.00%
2007	321	0	0.00%
2008	308	0	0.00%
2009	290	0	0.00%
2010	266	0	0.00%
2011	252	0	0.00%
2012	246	0	0.00%
2013	229	0	0.00%
2014	224	6	2.68%
2015	220	0	0.00%
2016	209	0	0.00%
Total	9,842	104	1.06%

(4a) Average lifetime of permit	21.00
(4b) Selected average lifetime of permits w/o forfeitures	19.00
(5) Ohio indicated forfeiture annual incremental rate	0.06%
(6) Kentucky forfeiture annual incremental rate	0.99%
(7) West Virginia forfeiture annual incremental rate	1.08%
(8) Weighted indicated forfeiture annual incremental rate	0.34%
(9) Ohio selected forfeiture annual incremental rate	0.33%

Footnotes:

(1)	Historical Ohio permit data
(2)	Historical Ohio permit data
(3)	Col (2) / Col (1)
(4a)	Exhibit 3.1
(4b)	Selected average lifetime based on assumption of minimal forfeitures within the first two years of issuance
(5)	Col (3) / Row (4b)
(6)	From Pinnacle analysis of Kentucky data applied to Ohio permit count by mine type distribution
(7)	From Pinnacle analysis of West Virginia data applied to Ohio permit count by mine type distribution
(8)	Weighted average of rows (5) through (7) based on… OH = 75.0%, KY = 12.5% and WV = 12.5%
(9)	Selected based on rows (5) through (8)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 2.2
Land Reclamation Expenditures

Calendar Year	Gross			Net		
	Expenditure	Inflated	Discounted	Expenditure	Inflated	Discounted
	(1)	(2)	(3)	(4)	(5)	(6)
2016						
2017	**2,225,580**	2,225,580	2,216,401	**2,225,580**	2,225,580	2,216,401
2018	**2,452,499**	2,452,499	2,412,946	**2,452,499**	2,452,499	2,412,946
2019	**1,110,589**	1,127,125	1,092,559	**1,110,589**	1,127,125	1,092,559
2020	2,788,896	2,915,333	2,778,142	2,585,970	2,703,207	2,575,999
2021	2,789,296	3,010,504	2,814,515	2,585,970	2,791,053	2,609,351
2022	2,799,636	3,127,422	2,863,965	2,596,043	2,899,993	2,655,694
2023	2,672,307	3,097,121	2,774,077	2,475,984	2,869,588	2,570,277
2024	2,672,307	3,221,006	2,820,176	2,475,984	2,984,372	2,612,989
2025	2,672,307	3,349,846	2,865,081	2,475,984	3,103,747	2,654,595
2026	1,886,763	2,459,740	2,053,875	1,758,730	2,292,826	1,914,502
2027	977,167	1,324,873	1,079,598	905,337	1,227,483	1,000,238
2028	686,147	967,510	769,165	640,757	903,508	718,284
2029	607,969	891,566	691,233	567,043	831,549	644,701
2030	607,969	927,229	700,870	567,043	864,811	653,690
2031	607,969	964,318	710,364	567,043	899,403	662,545
2032	607,969	1,002,891	719,777	567,043	935,379	671,324
2033	217,459	373,063	260,760	200,661	344,246	240,617
2034	81,261	144,984	98,666	76,304	136,140	92,647
2035	81,261	150,784	99,866	76,304	141,585	93,774
2036	81,261	156,815	101,052	76,304	147,249	94,887
2037	67,707	135,885	85,171	63,523	127,489	79,908
2038	67,707	141,320	86,140	63,523	132,588	80,817
2039	67,707	146,973	87,095	63,523	137,892	81,713
2040	67,707	152,852	88,043	63,523	143,407	82,603
Total	28,897,441	34,467,239	30,269,536	27,241,264	32,422,717	28,513,061

Footnotes:

(1) See report for details.
Years 2017-2019 reflect current reclamation projects
Payments for future forfeitures delayed by three years to reflect period between forfeiture order and reclamation activity.

(2) Col (1) x annual inflation of…
0.0% for years 2017-18
3.0% for years 2019-20
3.5% for years 2021-22
4.0% for years 2023 & Subs

(3) Col (2) + Col (2) x Exhibit 8 Col (3)

(4) See report for details
Years 2017-2019 reflect current reclamation projec
Payments for future forfeitures delayed by three years to reflect period between forfeiture order and reclamation activity.

(5) Col (4) x annual inflation of…
0.0% for years 2017-18
3.0% for years 2019-20
3.5% for years 2021-22
4.0% for years 2023 & Subs

(6) Col (5) + Col (5) x Exhibit 8 Col (3)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 5.1
Forfeiture Rates

Years Since Issuance	All Permit Types (1)
1	0.00%
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10	0.67%
11	0.67%
12	0.67%
13	0.67%
14	0.67%
15	0.67%
16	0.67%
17	0.67%
18	0.67%
19	0.67%
20	0.67%

Footnotes:
(1) Exhibit 5.2 Row (9)

OHIO RECLAMATION FORFEITURE FUND ANALYSIS
SPRING 2017

Exhibit 5.2
Forfeiture Rate Calculation

Calendar Year	Number of Permits In Force	Number of Permits Forfeited	Forfeiture Rate
	(1)	(2)	(3)
1993	799	17	2.13%
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1995	722	27	3.74%
1996	683	4	0.59%
1997	579	4	0.69%
1998	568	4	0.70%
1999	563	17	3.02%
2000	456	2	0.44%
2001	389	4	1.03%
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2004	356	1	0.28%
2005	338	8	2.37%
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2007	321	0	0.00%
2008	308	0	0.00%
2009	290	0	0.00%
2010	266	0	0.00%
2011	252	0	0.00%
2012	246	0	0.00%
2013	229	0	0.00%
2014	224	6	2.68%
2015	220	0	0.00%
2016	209	0	0.00%
Total	9,842	104	1.06%

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(4b) Selected average lifetime of permits w/o forfeitures	19.00
(5) Ohio indicated forfeiture annual incremental rate	0.06%
(6) Kentucky forfeiture annual incremental rate	0.99%
(7) West Virginia forfeiture annual incremental rate	1.08%
(8) Weighted indicated forfeiture annual incremental rate	0.67%
(9) Ohio selected forfeiture annual incremental rate	0.67%

Footnotes:

(1)	Historical Ohio permit data
(2)	Historical Ohio permit data
(3)	Col (2) / Col (1)
(4a)	Exhibit 3.1
(4b)	Selected average lifetime based on assumption of minimal forfeitures within the first two years of issuance
(5)	Col (3) / Row (4b)
(6)	From Pinnacle analysis of Kentucky data applied to Ohio permit count by mine type distribution
(7)	From Pinnacle analysis of West Virginia data applied to Ohio permit count by mine type distribution
(8)	Weighted average of rows (5) through (7) based on… OH = 45.0%, KY = 27.5% and WV = 27.5%
(9)	Selected based on rows (5) through (8)