INTEGRATION OF SURFACE WATER MANAGEMENT WITH MITIGATION OF GROUND WATER IMPACTS AT A PROPOSED PHOSPHATE MINE OVERBURDEN FACILITY[1]

Brian W. Buck[2] and Bruce Winegar

Abstract

Environmental impact evaluation of proposed phosphate mine overburden fills at the J.R. Simplot Smoky Canyon Mine, in Southeastern Idaho indicated that leaching of the overburden by infiltrating precipitation could potentially contaminate local ground water with selenium. The Idaho Department of Environmental Quality (IDEQ) required that ground water impacts be reasonably localized to the immediate mine vicinity. A number of best management practices (BMPs) were incorporated into the design of the overburden fills to reduce potential surface water and ground water impacts, but ground water quality impacts were still predicted to extend off site in the long term (100 years). A number of alternatives were then evaluated to reduce the infiltration of precipitation into the overburden through use of low permeability covers. These were rejected for cost and engineering feasibility reasons. Use of modified infiltration trench technology for storm water management at the periphery of the proposed overburden fills was then evaluated for recharge of runoff into the local ground water. Both the State and the EPA already approve this technology as a storm water management BMP. Ground water impact modeling showed that incorporation of runoff recharge areas into the margins of the overburden fills would be effective in containing the area of ground water impacts to the immediate mine vicinity. This design was eventually approved by the IDEQ, EPA, and the Federal land management agencies and has potential applicability in similar hydrogeologic situations at other mining operations.

Background

The J. R. Simplot Company Smoky Canyon Mine is located in Southeastern Idaho approximately 10 miles west of Afton, Wyoming (Figure 1). It produces phosphate ore from a series of open pits oriented roughly north-south along the strike of the Phosphoria Formation which hosts the phosphate ore bodies. The ore is hauled to the on-site mill that crushes and concentrates

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[2] Brian W. Buck Geological Engineer, Vice President, JBR Environmental Consultants, Inc., Sandy, UT
Bruce Winegar Senior Environmental Manager, J. R. Simplot Company Corporate Regulatory Affairs, Pocatello, ID

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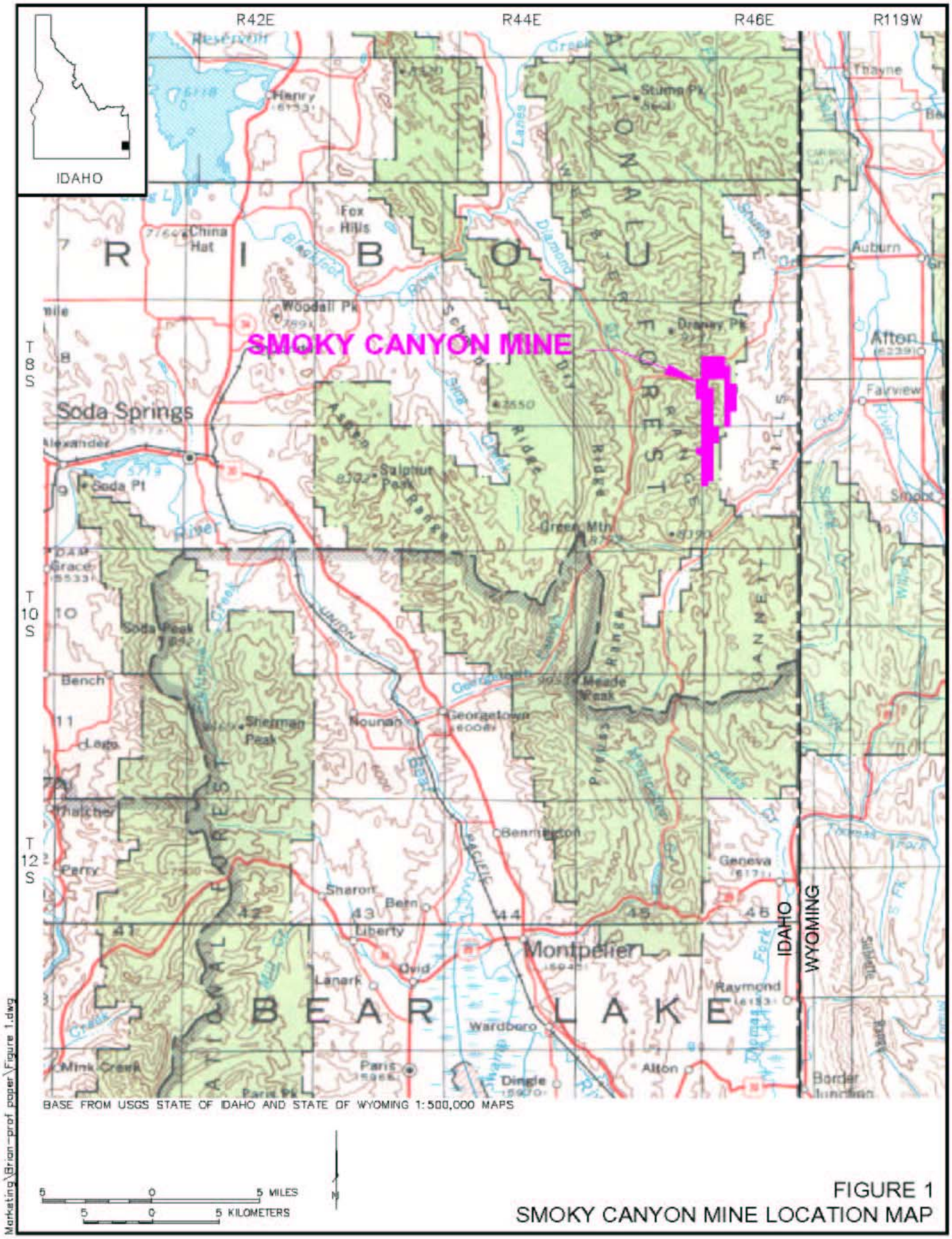

FIGURE 1
SMOKY CANYON MINE LOCATION MAP

the phosphate ore, which is then shipped via a buried slurry pipeline to Simplot's fertilizer plant at Pocatello, Idaho. Mill tailings are disposed of in an on-site tailings pond.

Overburden encountered during mining consists of chert and limestone of the Rex Chert and shales and mudstones of the Phosphoria Formation. These materials are typically used to backfill previous pits as the mining progresses, but overburden swell and hauling logistics require that a portion of the overburden be disposed of in overburden fills external to the pits.

Phosphorous is an important element for agricultural and chemical industrial uses worldwide. The United States contains approximately 4.2 billion tons of phosphate ore, about 14 % of the known world reserves (USGS, 2000). In 1975, the western phosphate field in Southeastern Idaho was estimated to contain approximately one billion tons, about a quarter of the U.S. reserves (USGS, 1977). Phosphate ore has been mined in Idaho since about 1907 with major production commencing in the 1940's. There are a number of active phosphate mining operations in Idaho that, in a normal market, produce an aggregate of about six million tons of ore annually.

In 1981, the United States Forest Service (USFS), and Department of the Interior prepared an environmental impact statement to review the environmental effects of the proposed mining activity in five open pits (Panels A through E) at the Smoky Canyon Mine (USFS, 1981). Mining began in 1984 and continues today with development of open pits, overburden fills, and other facilities authorized by the permits (Figure 2).

The Bureau of Land Management (BLM) and the USFS review all detailed mining plans prepared by Simplot for the mine and conduct any supplemental environmental impact analysis necessary to determine appropriate impact mitigation measures. In 1999, the agencies were conducting such a review of the detailed mine plans for Panels B and C when a decision was made to prepare a supplemental environmental impact statement (SEIS). This document was intended to review the impacts from the proposed operations and alternatives in light of information obtained since 1981 related to potential impacts from selenium and newly listed threatened, endangered and sensitive species. The main focus of the SEIS was to review the potential for impacts from selenium, which is a potential contaminant of concern in the mine overburden shale.

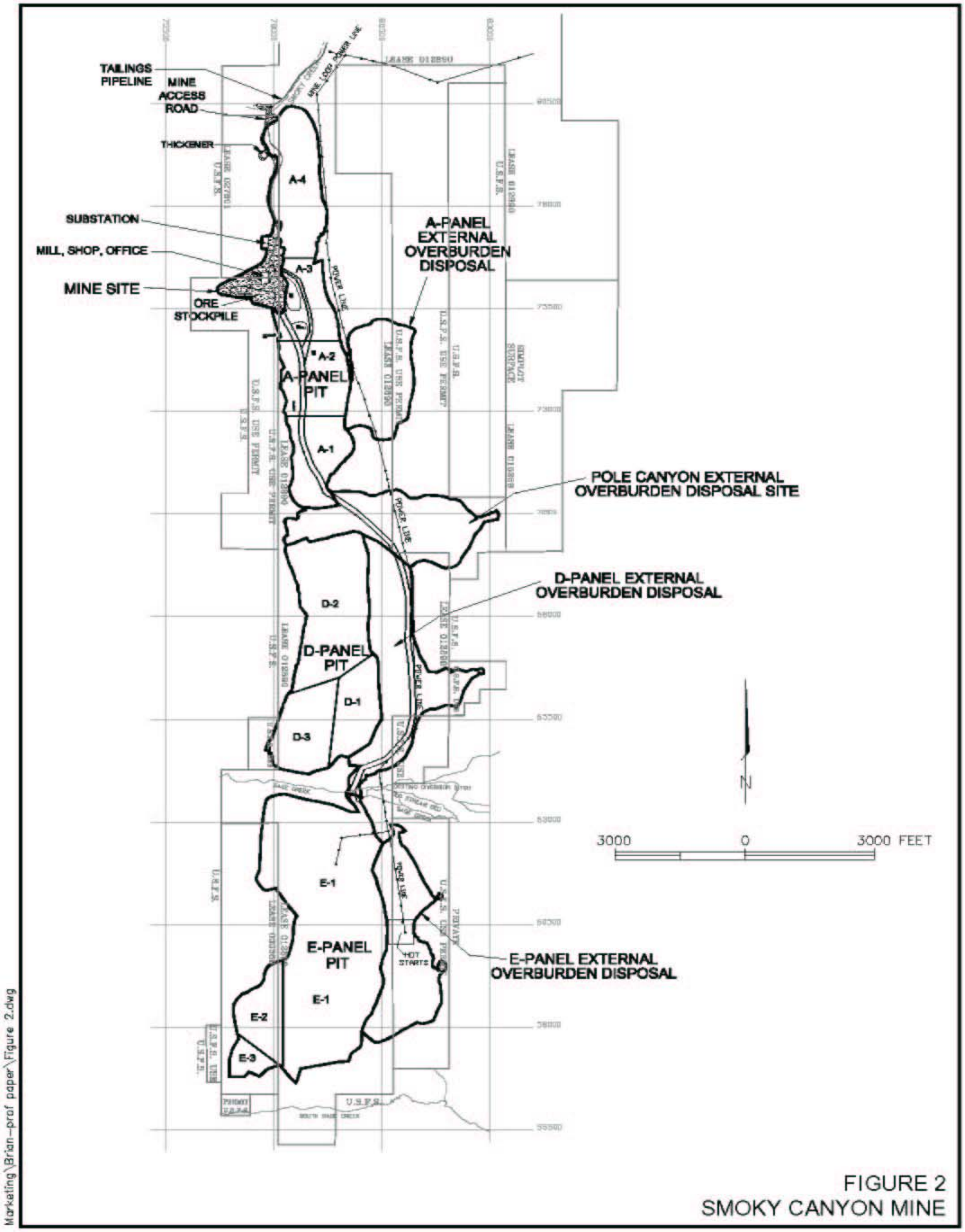

FIGURE 2
SMOKY CANYON MINE

Phosphate Overburden as a Selenium Source

Selenium has been recognized as being present in the phosphate-hosting beds of the Phosphoria Formation for some time (USFS, 1981). However, it did not attract much attention as a potential environmental issue in the phosphate production area of Southeastern Idaho until 1997 when livestock were diagnosed with selenosis down-gradient of a phosphate mine overburden fill. Since then, a great deal of study has been focused on the local selenium occurrence, mobility and environmental impacts by the State of Idaho, USFS, BLM, and the phosphate mining industry in Southeastern Idaho.

Selenium in trace quantities is an important nutrient for human health (ATSDR, 1996). It should be present in small quantities in human and livestock food but can be toxic at higher doses. Selenium toxicity is not generally considered to be a problem for humans but toxicity impacts have been documented for wildlife and livestock in specific areas where mobile forms of selenium are present in elevated concentrations in the environment. Selenium has been known to bioaccumulate in some plants and animals that are chronically exposed to the contaminant (Herring et al, 1999). Animals exposed to high doses of selenium can themselves accumulate and biomagnify toxic concentrations of the contaminant and display symptoms of chronic selenium poisoning (selenosis). A number of studies have been conducted in the United States where elevated selenium concentrations in surface waters and wildlife have been caused by irrigation drainage (Seiler et. al. 1999, Luoma and Presser, 2000, USGS, 2002).

Selenium in the phosphate mine overburden is present as relatively insoluble selenide (Se-II) and native elemental selenium (Se) that, in their natural forms, are not mobile in the environment and do not present much toxicity risk to animals. After weathering and oxidation, seleniferous mine overburden can produce soluble compounds of selenite (SeIV) and selenate (SeVI). These soluble oxidation products can be taken up by vegetation growing in the overburden and can be transported out of the overburden materials in runoff or infiltration water percolating through the overburden fills (Desborough et al., 1999).

Selenium accumulation in vegetation growing directly in seleniferous overburden has been documented throughout the Southeastern Idaho phosphate area (BLM, 2002), and specifically at the Smoky Canyon Mine (JBR, 2000). The Smoky Canyon studies have shown that selenium bioaccumulation in plants can be prevented by capping the seleniferous overburden materials with enough non-seleniferous overburden to prevent contact of vegetation roots with the seleniferous materials and/or by eliminating certain selenium accumulator species from revegetation seed mixes.

Solid particles may be eroded from seleniferous overburden and transported physically as part of the suspended sediment load in runoff. Soluble forms of selenium can also be dissolved in the soil moisture within seleniferous overburden and mobilized by runoff. Monitoring of the various open pits and sediment ponds at the Idaho phosphate mines has indicated elevated total selenium concentrations, demonstrating the potential for mobilization of selenium to surface runoff from uncovered phosphate overburden fills (BLM, 2002, Appendix 4B). Phosphate mines in Idaho typically utilize EPA and Idaho Best Management Practices for control of erosion, runoff, and sedimentation impacts at phosphate overburden fills in Southeastern Idaho (IMA, 2000).

The final primary pathway for selenium mobilization is via percolation of precipitation through seleniferous overburden. This mechanism is widely recognized as a potential source of environmental impacts, but monitoring this movement of water through unsaturated rock is difficult (Whiting, 1985 and EPA, 2001). This water can either exit the outer surface of the overburden in seeps at the base of the fills, or it can continue to migrate downward as ground water. Seleniferous overburden seeps have been documented in the phosphate mining area of Southeastern Idaho (BLM, 2002, Appendix 4B) and a few have occurred at the Smoky Canyon Mine (Simplot, 2002). Ground water impact modeling conducted recently for phosphate mining EISs in Southeastern Idaho has predicted potential ground water quality impacts from percolation of water through overburden (BLM, 2000 and 2002).

The potential ground water impacts from phosphate overburden have been studied in Idaho by using column leach tests of overburden samples that are representative of the different overburden lithologies in the mining operations. Sequential leaching of multiple pore volumes of water through these columns can indicate concentrations of selenium and other potential contaminants in the leachate; and the changes in these concentrations as increasing quantities of water is percolated through the columns. Geochemical testing conducted for the Smoky Canyon Mine B and C Panels indicated that non-seleniferous overburden, such as chert and limestone, does not produce problematic leachate chemistry. These tests also showed that concentrations above the 0.05 mg/l selenium ground water standard can occur in the overburden shale leachate within the first two pore volumes, after which the leachate concentrations decrease to asymptotic levels that are low enough to not exceed the standard (Figure 3) (Maxim, 2001).

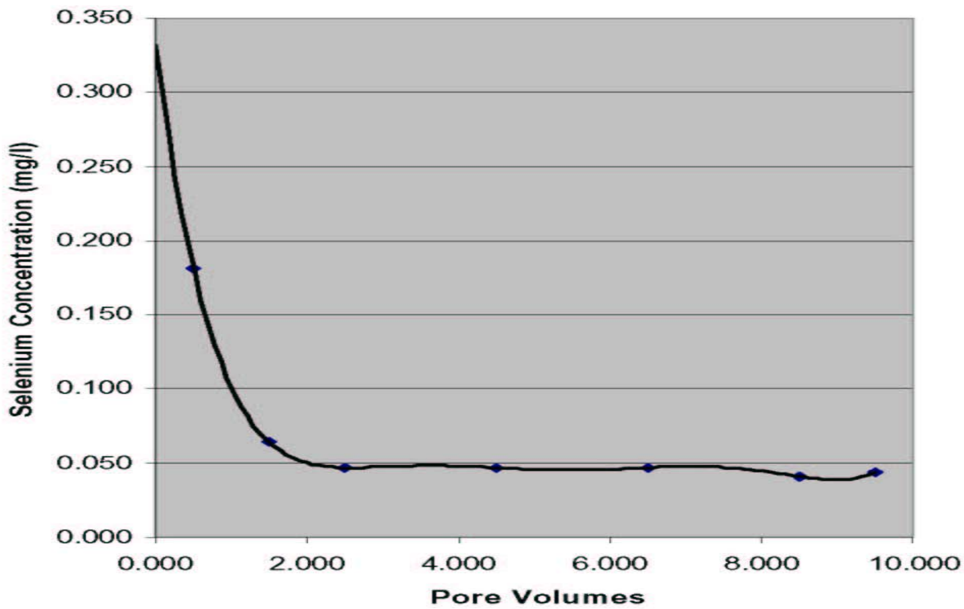

FIGURE 3
SELENIUM CONCENTRATION IN COLUMN TESTS

Initially Planned Mitigation

Simplot recognized the potential for releases of selenium and other potential contaminants in overburden at the Smoky Canyon Mine and incorporated various mitigation measures into the design of the overburden fills for the proposed B and C Panel operations. These included:

- Selective handling of seleniferous and non-seleniferous overburden to allow the burial of seleniferous material beneath engineered covers of non-seleniferous chert and limestone;
- Placing the maximum amount of seleniferous overburden reasonably possible into open pits, where it would be less likely to be affected by erosion;
- Capping all areas of seleniferous overburden with a minimum thickness of eight feet of non-seleniferous overburden and one to three feet of non-seleniferous soil to prevent erosion of

the seleniferous overburden and contact by most vegetation roots;

- Designing all final surfaces with a minimum 2 % and a maximum 33 % grade to ensure that ponding will not occur on top of the overburden;
- Locating all overburden fills out of perennial drainage channels and designing stable channels over the fills for any ephemeral or intermittent drainages, incorporating provisions to reduce infiltration of stream flow into underlying seleniferous overburden;
- Paying special attention to foundation preparation and construction of the lower levels of the fills to prevent continuous, high permeability overburden layers at the bases of the fills, which could allow penetration of atmosphere and provide preferential flow paths for downward percolation to exit at the edges of the fills;
- Installation of runoff, erosion, and sedimentation controls consistent with State and EPA Best Management Practices to prevent release of runoff from storm events up to the 100-year, 24-hour recurrence interval, on top of a snow melt happening at the same time, and;
- Revegetating all reclaimed overburden fill surfaces with a perennial, approved seed mixture satisfactory to the regulatory agencies, which excludes known selenium accumulator species.

Approximately 69% of the overburden produced from the proposed B and C Panels was to be placed in the same pits and in the north half of a previous open pit (Panel A) that had not yet been backfilled. The backfilled pits would disturb 274 acres. The other 31% of the overburden, approximately 20.8 million loose cubic yards, was planned to be disposed of in a 244-acre overburden fill external to the open pits (Figure 4). The mitigation measures proposed by Simplot were considered satisfactory to adequately protect vegetation, wildlife, livestock, forest resources, soil, and surface water from selenium impacts. The remaining concern was the potential for contaminated leachate from seleniferous overburden exiting the overburden fills in seeps and/or percolating downward and contaminating the underlying aquifer.

The chert and topsoil cap should reduce the exposure of the shale to only the net infiltration remaining after all evaporation and plant transpiration occurs. However, the design of the proposed chert and soil cap did not include a low-permeability infiltration barrier, which would further limit infiltration from the cap into the overburden shale.

An evaluation of potential infiltration barriers was conducted to determine the feasibility of incorporating an infiltration barrier in the overburden cap design [BLM, 2002, Appendix 2C]. This study evaluated the technical and economic feasibility of building an infiltration barrier with: clay soil, geosynthetic clay liner, plastic membranes, soil cement, asphalt paving, and sprayed asphalt. The estimated construction costs for these infiltration barriers ranged from $45,500 to $67,300 per acre. It was determined that building an infiltration barrier over more than 500 acres of overburden was technically difficult and not economically feasible.

Initial Modeled Ground water Impacts

At the Smoky Canyon Mine, long-term (100-year), annual infiltration and runoff rates were predicted using the HELP3.07 infiltration model [BLM, 2002, Appendix 4C]. The HELP3 model was developed by the U.S. Corps of Engineers to assess seepage of precipitation through solid waste fills and predicts the partitioning of the annual precipitation into site runoff, infiltration, evapo-transpiration, and internal lateral drainage (USCOE, 1994) and has been widely used in areas of high average annual precipitation similar to the 33.6 inches at the Smoky Canyon site. It predicted an average annual infiltration rate of about 4 inches per year and a runoff amount of 12.8 inches per year for the reclaimed mine disturbances. The rest of the annual precipitation was predicted to be lost to evapo-transpiration. The predicted infiltration rate is about the same as the natural recharge estimates for the same area determined through watershed studies (Ralston, 1979).

The estimated ground water impacts under the overburden was assessed using data on potential leachate chemistry and the predicted infiltration rates to calculate an annual contaminant loading to the ground water. The fate and transport of the contaminants in the ground water were modeled using the MODFOW and MT3D computer codes (BLM, 2001 and 2002)

The aquifer at the Smoky Canyon B and C Panels site that is most likely to be impacted by seepage of infiltration through the overburden is contained in sandstone and limestone of the Grandeur and Wells formations that underlie the Phosphoria Formation. The Wells Formation aquifer is regionally important (Ralston, 1979). At the B and C Panels site, these units generally dip to the west and northwest, and ground water in the Wells Formation is also thought to flow in these directions (Figure 5).

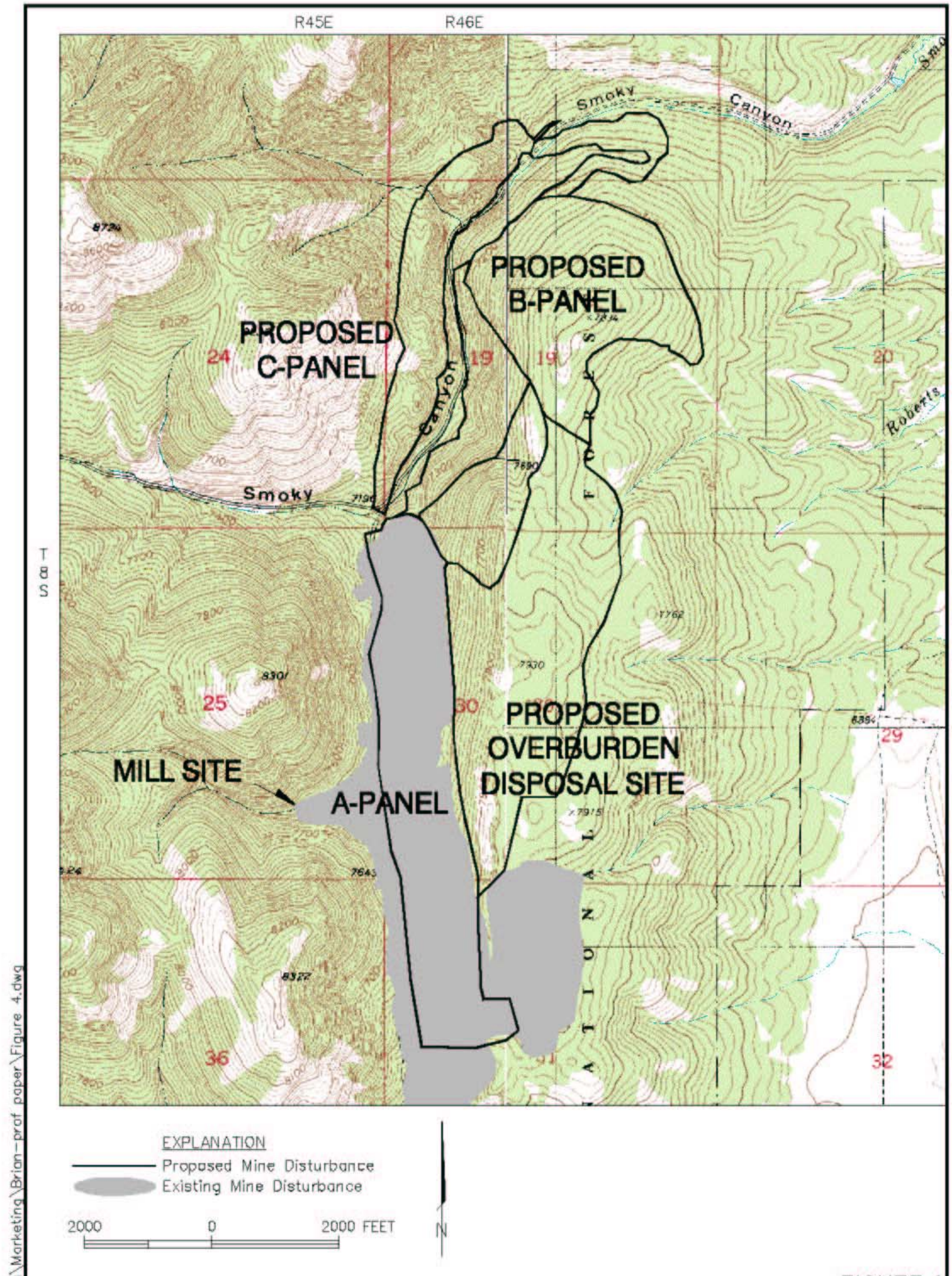

FIGURE 4
SITE MAP WITH PROPOSED B AND C PANELS

The Smoky Canyon ground water modeling predicted down-gradient transport of the constituents in the seepage at the end of a 100-year period. The only constituents that were predicted to exceed ground water protection standards, equal to Federal drinking water standards or Maximum Contaminant Levels (MCLs), were manganese and selenium. Contaminant plumes, defined as ground water concentrations greater than the MCLs, were predicted to exist under the overburden fills and outside the boundaries of these fills (Figure 6).

Additional Mitigation Through Runoff Recharge Areas

The initial ground water impact modeling for the Smoky Canyon B and C Panels only considered the effect of the net annual infiltration (4 inches) and the resulting contaminated seepage through the overburden. The average annual runoff from the reclaimed overburden fills (12.8 inches) was initially assumed to be discharged to the local watersheds and its infiltration into the ground was ignored (BLM, 2001). In its comments on the Draft SEIS, Simplot raised the point that this runoff would be uncontaminated by contact with seleniferous shale and could possibly be used to mitigate the predicted ground water impacts.

The BLM and USFS agreed with Simplot and recognized that the amount of clean runoff from the overburden fills was predicted to be more than three times the amount of infiltration. It was further recognized that, if this large volume of clean water could be collected and introduced into the ground, it could change local ground water flow patterns, and increase the amount of clean water in the flow system. Both of these effects could reduce the concentration of the ground water quality impact caused by the seepage through the overburden.

Introduction of uncontaminated surface runoff from disturbed areas into the ground is not a new concept. Infiltration of surface runoff into the ground under collection ponds and in constructed infiltration trenches are considered by the EPA as Best Management Practices (BMPs) for post-construction storm water management (EPA, 2002). Infiltration trenches are also approved as BMPs by the Idaho Department of Environmental Quality (IDEQ, 2002).

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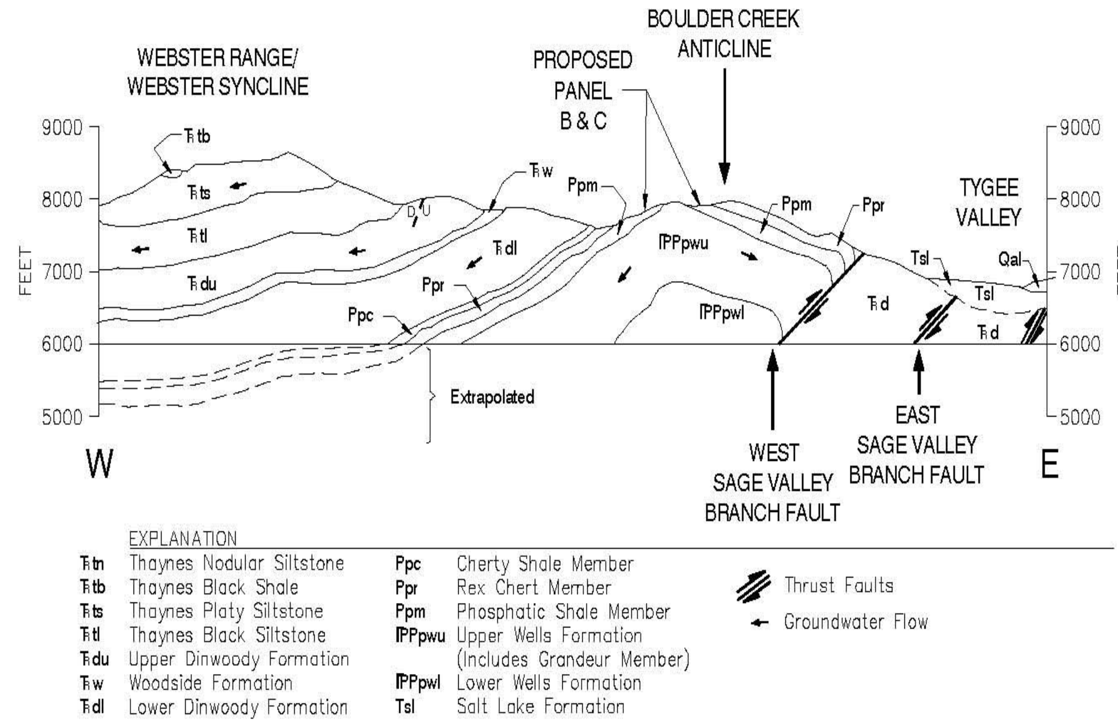

Ref: Revised from Smokey Canyon Draft EIS, 1981

FIGURE 5
HYDROGEOLOGIC CROSS SECTION

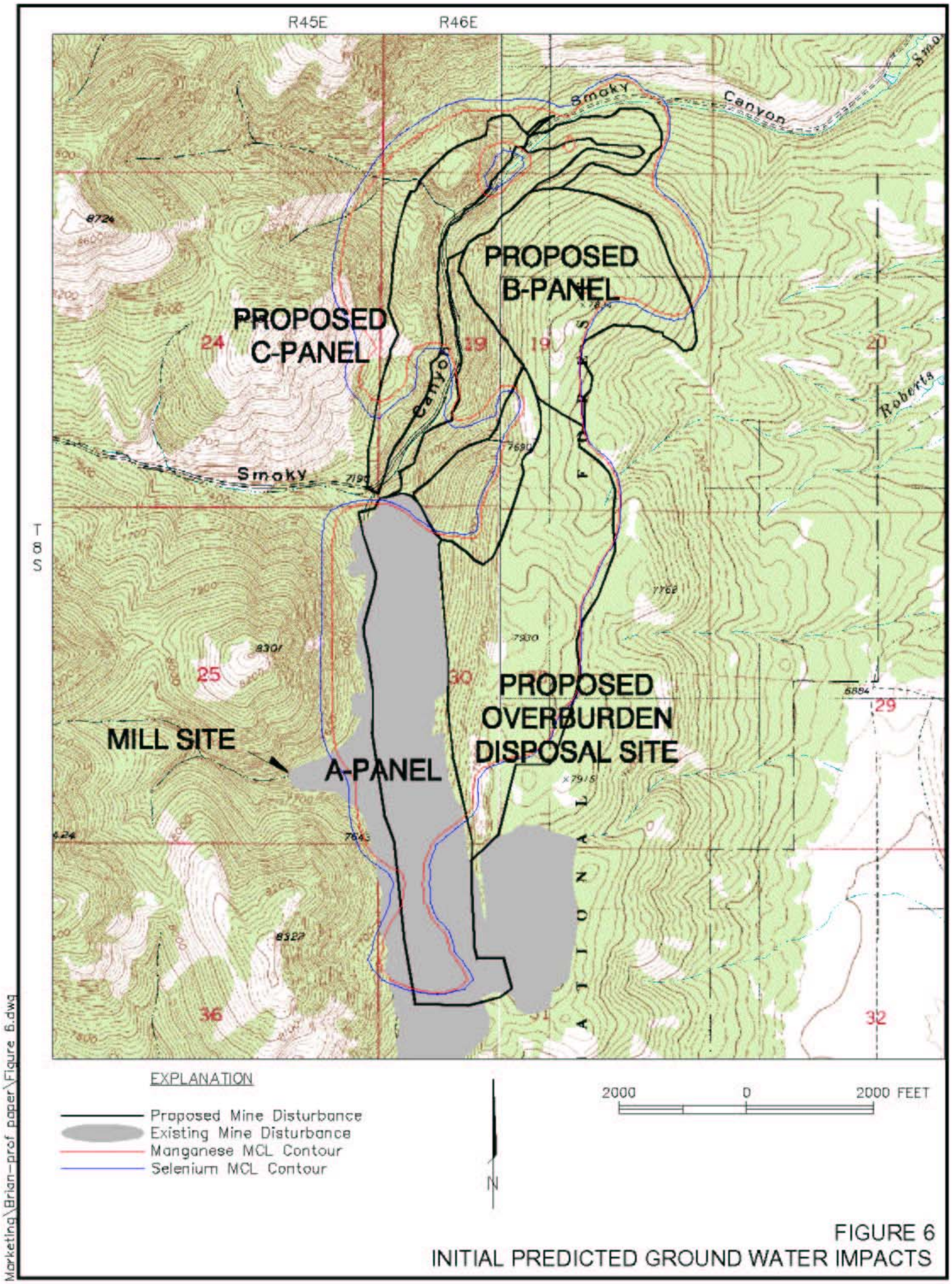

FIGURE 6
INITIAL PREDICTED GROUND WATER IMPACTS

The overburden handling for the B and C Panels operations already included plans to separately handle and place non-seleniferous chert and limestone differently from the seleniferous shale. It was recognized the design of the overburden fills in the B and C Panel operations could be modified to use the chert overburden to build runoff collection and infiltration areas where the uncontaminated surface runoff from the reclaimed overburden surfaces could be collected and infiltrated into the ground, rather than discharged to the surface drainages. These areas of permeable chert overburden, intended to collect and infiltrate runoff water, were called Runoff Recharge Areas (RRAs).

The RRAs were planned to be long, relatively narrow zones of chert overburden at the bottoms of the overburden slopes where the clean runoff from the higher areas of the overburden surfaces could be collected and infiltrated into the subsurface. Where these RRAs were to be located in pit backfills, the pit floors would be cleaned of any low permeability shale to expose the underlying permeable limestone. Where the RRAs were to be located at the base of the external overburden slopes, any low permeability soil and subsoil would be removed to expose permeable limestone and sandstone. Percolation testing would be conducted in the RRA footprints to ensure that the average percolation rate was sufficient. If percolation testing indicated the infiltration rate needed to be increased, this could be done through either ripping or blasting. The chert used to build the RRAs would be run-of-mine material which is known to have a hydraulic conductivity of 0.01 to 0.02 cm/sec (BLM, 2002, Appendix 4C). This is equivalent to an infiltration rate of between 28.5 and 57 ft/day. To enhance the infiltration of runoff water into the chert, the RRAs would not be topsoiled like the rest of the overburden fills and the surface of the RRAs would be ripped with a dozer to produce a surface where runoff water would readily collect and infiltrate.

Three of the RRAs (A Panel, B-4, and C-2) were designed to collect runoff from the surface of pit backfills and convey this water through the backfills in chimney drains (Figure 7). The water impinging on the base of these chimney drains would percolate through the pit floors (Figure 8). The two other RRAs (East and West External) were designed to collect runoff from the surface of the external overburden fill and direct it into the ground at the margin of the overburden (Figure 9).

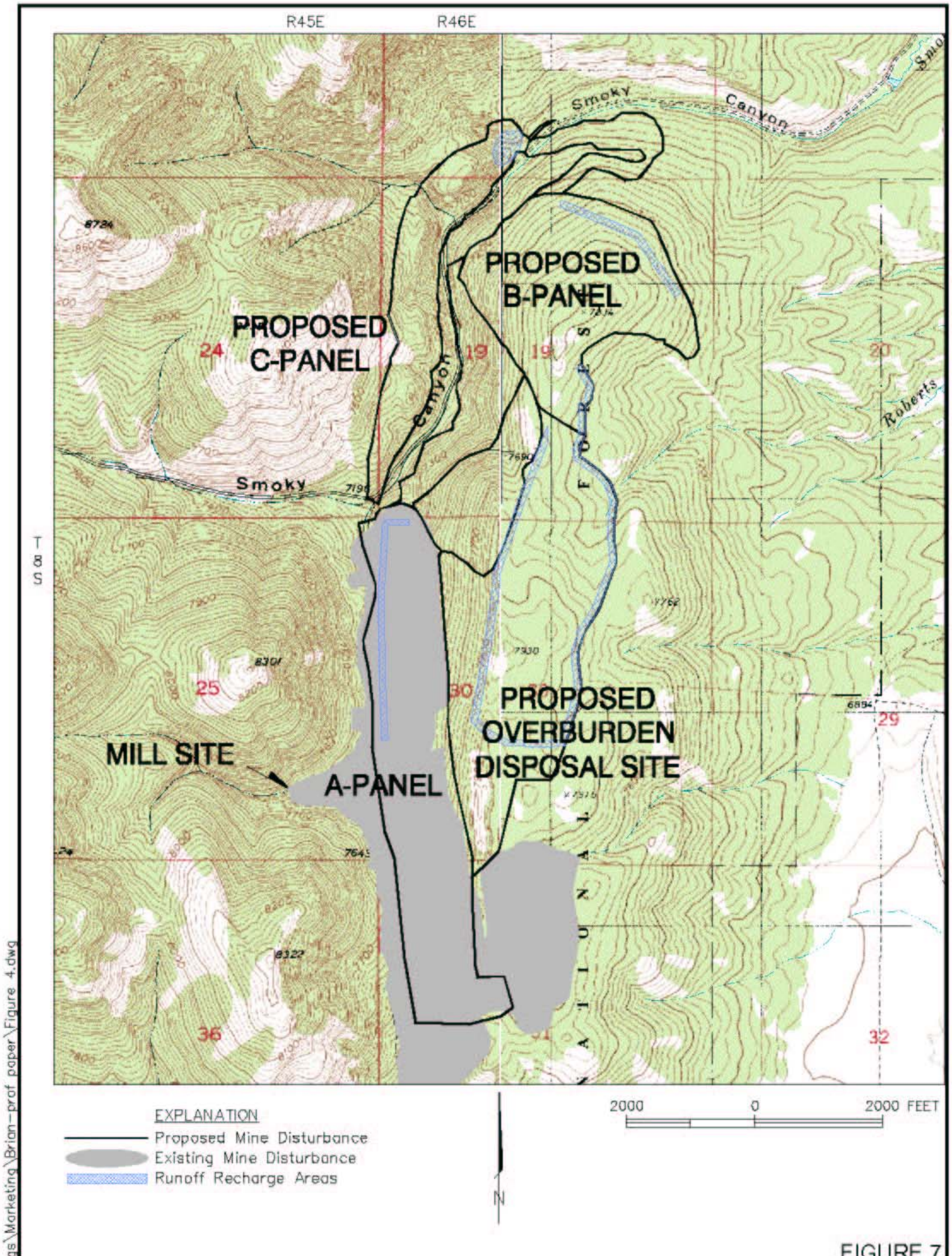

FIGURE 7
SITE MAP WITH PROPOSED RUNOFF RECHARGE AREAS

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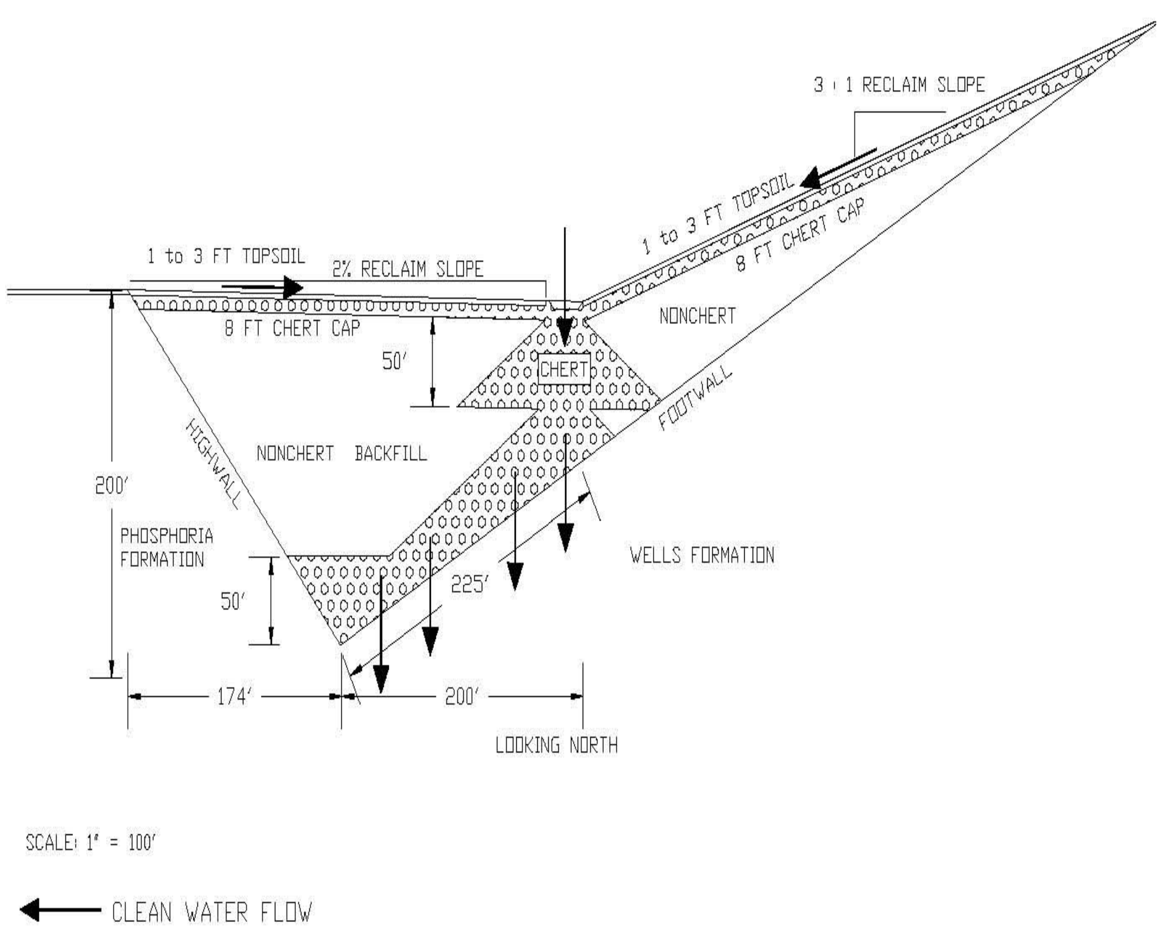

FIGURE 8
PANEL A BACKFILL RUNOFF RECHARGE AREA DESIGN

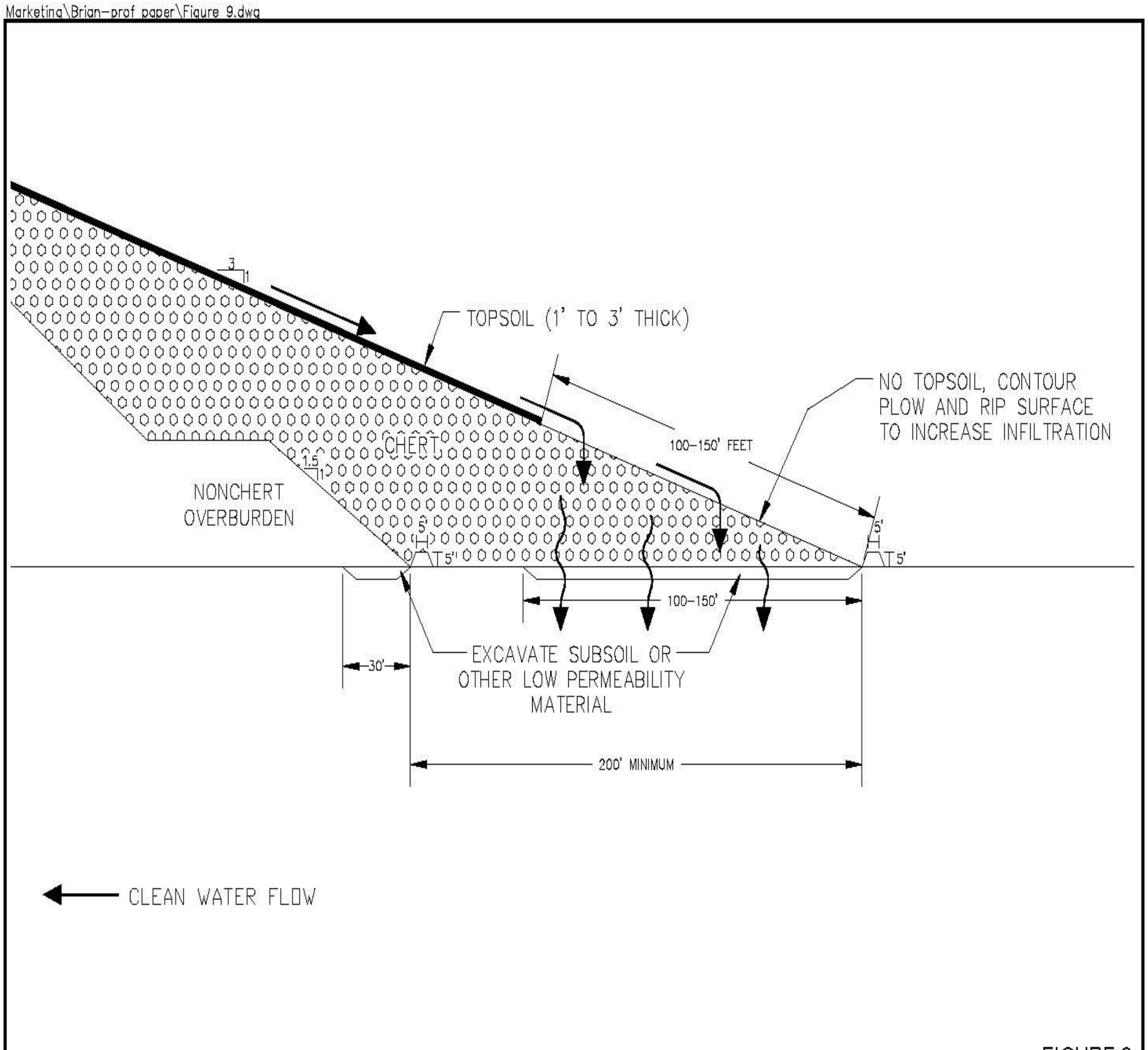

FIGURE 9
EXTERNAL OVERBURDEN FILL RUNOFF RECHARGE AREA DESIGN

The areas drained by the RRAs were less than 5.8 acres of watershed per100 feet of RRA. This is less than the 10 acres of watershed per infiltration trench recommended by the EPA (EPA, 2002). The average annual infiltration rate that is required for the RRAs is 0.4 inch/day or less (Table 1).

Table 1. Summary of Watershed and Annual Runoff Quantities

I.D	Runoff Area (ac)	Water Vol. (ac-ft)	Dimensions (ft)	Infil. Area (ac)	Annual Infil. Rate (inch/day)
B-4	63.2	67.4	100 x 2400	5.5	0.4
C-2	4	4.3	417 x 417	4	0.14
A Panel	208.8	222.7	225 x 3600	18.6	0.4
East Ext.	131.3	140.1	150 x 6300	21.7	0.21
West Ext.	47.6	50.8	100 x 5700	13.1	0.13

However, most of the annual runoff occurs in the spring. The HELP3 modeling results show that the runoff for March is predicted to be 7.18 inches and the runoff in April is predicted to be 3.83 inches for a total, 2-month runoff of 11 inches. This would occur over 60 days. The required infiltration rates for the spring runoff are 2.1inch/day or less (Table 2).

Table 2. Summary of Watershed and Spring Runoff Quantities

I.D	Runoff Area (ac)	Water Vol. (ac-ft)*	Dimensions (ft)	Infil. Area (ac)	60-day Infil. Rate (inch/day)
B-4	63.2	57.9	100 x 2400	5.5	2.1
C-2	4	3.7	417 x 417	4	0.74
A Panel	208.8	191.4	225 x 3600	18.6	2.1
East Ext.	131.3	120.4	150 x 6300	21.7	1.1
West Ext.	47.6	43.6	100 x 5700	13.1	0.66

*Based on spring runoff of 11 inch in 60 days.

The required 60-day infiltration rate for the RRAs can be reduced with temporary storage of water in the base of the chert fill of the RRAs. This is particularly feasible where the RRAs are built in the pit backfills. The quantity of water storage in the chert at the base of these RRAs was calculated by determining the area of the contained cross section times the porosity (30%) of the chert, times the length of the RRA. Using the design geometries of the pit backfill RRAs and their storage capacities, the required 60-day maximum infiltration rates were shown to be 1.4 inches/day.

Past gain/loss studies of streams at the mine clearly show loss to infiltration where they flow over the Wells Formation. Gain/loss studies showed that the infiltration rate into the Smoky Canyon stream bottom, located between the proposed B and C Panels, was 3.9 inches/day.

Observations of seasonal ponding and infiltration of surface water in the A Panel open pit indicated that the infiltration rate into the bottom of this pit was approximately 0.9 to 1.8 inches/day, averaging 1.4 inches/day.

An interpretation of pump test data from a water supply well located immediately west of the A Panel showed that the overall vertical hydraulic conductivity of the Wells Formation in the mine area was estimated to be between 3 and 6 inches/day, averaging 4.5 inches/day.

All three of the infiltration estimates derived from existing field information show potential infiltration rates of 1.4 to 4.5 inches/day. These appear to be sufficient for the 60-day required infiltration rates for the RRAs, which range from 0.7 to 1.4 inches/day. However, Simplot will conduct infiltration testing of the foundation areas where the RRAs are to be constructed to determine if actual infiltration rates are sufficient. If the surface infiltration rates need to be increased, this would be done by ripping with a dozer or, if necessary drilling and blasting.

To prevent clogging of the RRAs with fine sediment, the upland watershed areas would be stabilized with vegetation and other erosion and sediment control measures. These would consist of rock filter berms on intervals along the contour of the slopes, mulching bare soil after reseeding, chemical stabilization of soil surfaces, and use of silt fences. All of these methods are accepted BMPs (EPA, 2002) with sediment control effectiveness shown below:

Erosion Control Method	Effectiveness
Seeding and Revegetation	90%
Rock Filter Berms	95%
Mulch on Bare Soil	58 – 99%
Chemical Stabilization on Bare Soil	70 – 90%
Silt Fences	70%

In addition to the application of erosion and sediment control BMPs in the upland watersheds to reduce introduction of fine sediment into the RRAs, the porosity (30%) and large volume of the RRAs could absorb a significant amount of sediment with minimal impact on permeability.

Revised Modeled Ground water Impacts

After the RRAs were designed, the water balance in the ground water flow model was revised to include the recharge under the RRAs. Recharge from natural flow in Smoky Creek was also included in the model. In addition, the concentrations for constituents in the overburden seepage were revised to more accurately follow the curve of concentrations predicted by the laboratory column tests. The result of the revised ground water fate and transport modeling is shown in Figure 10. These results indicated that concentrations of manganese and selenium over their MCLs were predicted to occur only beneath the actual disturbance footprint of the B and C Panels operations. This was not the case in the limited area west of the south half of A Panel where an existing pit backfill prevents installation of an RRA. Installation of the RRAs is predicted to be effective in constraining ground water quality impacts due to introduction of large quantities of clean water into the local ground water system.

Regulatory Setting

The Idaho Ground Water Quality Rule 58.01.11.400.01 provides that no person shall cause or allow the release of a contaminant into the environment such that it would cause a ground water quality standard to be exceeded, unless it is in accordance with a Consent Order or application of best management practices (BMPs"), best available methods ("BAMs"), or best practical methods ("BPMs"). Idaho law also has a provision which provides that naturally occurring constituents found in ground water within a specified active mineral extraction ("AME") area will not be considered contaminants as long as approved BMPs, BAMs, and BPMs are applied. Ground water quality standards do apply outside any AME area. These rules had never been actively applied to the phosphate mining industry prior to the FMC Dry Valley EIS in June 2000 (BLM, 2000).

Initial Regulatory Issues

BLM was unwilling to move forward with the final SEIS unless they were assured that Simplot's mine plan would comply with Idaho's Ground Water Quality Rule. BLM's concerns were, in part, based on a precedent set in an EIS for the nearby FMC Dry Valley Mine. In that instance, FMC had entered into a consent order with the State of Idaho to mitigate any exceedence of ground water quality standards that would occur outside the AME area

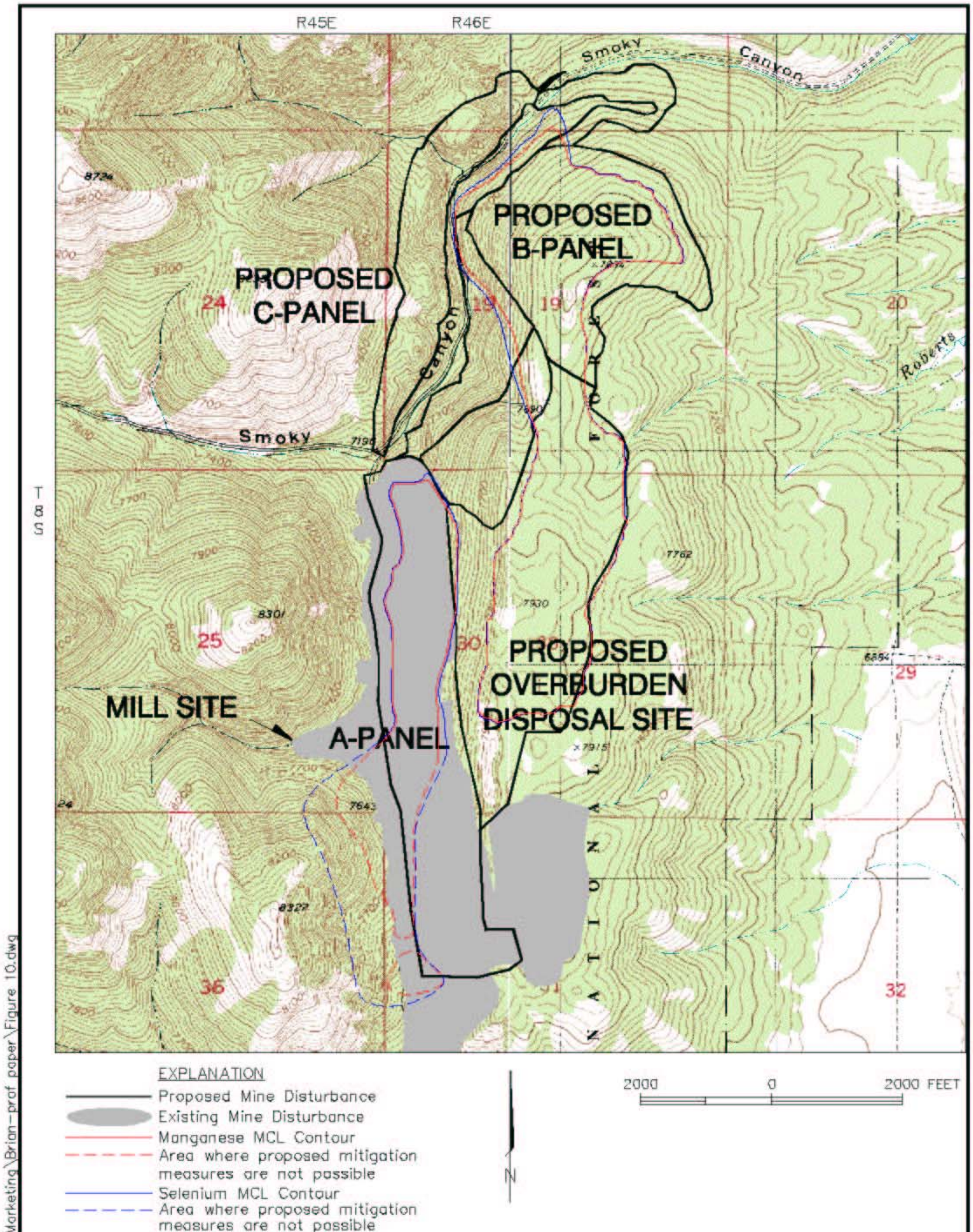

FIGURE 10
FINAL PREDICTED GROUND WATER IMPACTS

IDEQ interprets an AME to include the area inside a mining lease boundary, and that the extraction area is active until all bonds are released. Since the ground water modeling for the Smoky Canyon Mine predicted impacts may not occur for decades, Simplot had been hesitant to enter into a long-term consent order. Confident that the RRA's would control contamination of the ground water, Simplot agreed to a consent order, rather than risk further delay of the SEIS approval.

Approval Order

Under Idaho Code 39-101 et seq. IDEQ issued a consent order for the Smoky Canyon Mine B and C Panels. The consent order had the following general requirements:

1. Ground water monitoring will include 22 specified constituents.
2. One or two more ground water monitoring wells will be installed.
3. Background levels in the ground water will be established.
4. IDEQ will be notified if any background levels are exceeded.
5. A Corrective Action Plan ("CAP") will be developed if background levels are exceeded.
6. Financial assurance may be required to cover a CAP if contamination is to be mitigated.
7. A post-mining monitoring plan will be developed at the completion of the AME.
8. A Water Quality Monitoring plan was developed and monitoring will be required for 5 to 30 years following completion of the AME.
9. Any post-AME occurrence of contamination will require the same CAP and financial assurance as required during the AME period.

Final Authorization

EPA's initial review of the EIS had been critical of several issues, one being the potential contamination to ground water. EPA had proposed impervious liners to mitigate such an impact. Evaluation of such a liner by BLM and their contractor agreed with Simplot's evaluation that a liner was cost prohibitive and its integrity could not be guaranteed. As described earlier, the RRAs were shown to be consistent with EPA's own storm water BMPs. EPA ultimately accepted Simplot's mitigated plan that included RRAs to capture clean runoff water and direct it to the aquifer.

Paramount to BLM recommending the proposed action as the preferred alternative was the argument that the external overburden fill was designed and would function in the same manner as the backfilled pits. Great care was taken to show that the external overburden design was almost identical to the pit backfill design. The BLM Record of Decision included a requirement for an independent engineering firm to monitor construction and backfilling of the pits and the external overburden fill to assure compliance with the approved mine plan.

With the above provisions and approvals, Simplot needed only to finalize the Ground Water Consent Order with IDEQ. Once the order was signed, the last obstacle for BLM and the USFS to finalize the SEIS was removed. Based on the mitigated plan, BLM and the USFS chose the proposed action incorporating the RRAs as their Preferred Alternative. BLM then moved immediately to finalize and publish the Record of Decision.

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