



Larry  
Martin/FTCOLLINS/NPS  
03/07/2011 02:20 PM

To Gary Rosenlieb/FTCOLLINS/NPS@NPS  
cc Bill Jackson/FTCOLLINS/NPS@NPS  
bcc  
Subject Grand Canyon Uranium withdrawal DEIS

I won't be submitting comments regarding the DEIS for the proposed withdrawal of lands in Northern Arizona from uranium mining and exploration. My personal and professional opinion is that the potential impacts stated in the DEIS as grossly overestimated and even then they are very minor to negligible.

\* The DEIS goes to great lengths in an attempt to establish impacts to water resources from uranium mining. It fails to do so, but instead creates enough confusion and obfuscation of hydrogeologic principles to create the illusion that there could be adverse impacts if uranium mining occurred.

As an example, the ore bodies occur in association with the Hermit Formation and are about 1000 feet above the regional water table. Geologic formations between the ore body and the water table are primarily siltstone and mudstone of the Hermit Formation and Supai Group. These formations have very low permeability. There is no explanation for how potential contaminants might travel from the mine areas to the regional water table, but it is assumed that somehow that occurs and then contaminants flow many miles through the regional aquifer with no dilution, no degradation, and no concentration reduction. Even under those conditions, there is only a minuscule change in concentration of the most likely contaminants (arsenic and uranium) at the springs that discharge from the regional aquifer; and these changes are further diluted by mixing with surface waters downstream from the discharge areas.

\* Following are some of the important tidbits buried in the voluminous DEIS.

Page 3-57; The reason that ore deposits form in the breccia pipes is that the surrounding rock has very low permeability, which does not allow movement of groundwater through the mineral deposits. This condition inhibits dissolution of mineral deposits and prevents the minerals from being carried away by groundwater flow. Since the host and surrounding rock has low permeability, there is little to no potential for contaminants to migrate from mine sites.

Page 3-57; In general, the ore deposits are about 1000 feet above the R-aquifer and are underlain by low permeability breccias, siltstones/mudstones of the Hermit Formation and Supai Group. Therefore, conditions are not favorable for downward migration of leached minerals from the ore deposits to the R-aquifer.

Page 3-59; There are perched aquifers (usually above the Hermit Formation) in the region. Generally the perched aquifers are small, thin, and discontinuous.

Page 3-60; "It should be noted that environmental issues surrounding the Orphan Lode Mine

(which is outside the proposed withdrawal area) are the result of the lack of mine reclamation, which has allowed surface water and/or perched groundwater to collect within one or more of the mine adits and drain through the mine openings to the R-aquifer.”

Page 3-68; “Because of the ductile nature of the shale and mudstone strata, such as the Bright Angel Shale and Hermit Formation, it is likely that these strata will continue to act as barriers to retard groundwater movement, even where tectonic activity has occurred.” Or to say it in another way, even where the formations are fractured and faulted, the soft rocks heal the fractures, preventing groundwater flow.

Page 3-68; The long residence times of estimated for groundwater in the R-aquifer (outside the immediate vicinity of large springs along the canyon wall) supports the concept of slow groundwater movement which is conducive to gradual mixing and dilution along the flowpath.

Page 3-74; Large springs discharging from the North Rim (Deer Creek and Thunder River) are east of the Sinyala Fault and are not part of the groundwater system associated with the North Parcel. Exploration and mining activities in the North Parcel can not affect these springs.

Page 3-79; The ambient water quality of perched groundwater near mines is generally poor as a result of mineralization from the ore bodies. Groundwater that is contained within the breccia pipes is also generally of poor quality as a result of mineralization.

Page 4-60; The low permeability associated with ore deposits in the breccia pipes and adjacent rock strata between the base of the mine openings and R-aquifer are thought to retard downward movement of any perched groundwater drainage into the mines and, therefore, are not favorable for downward migration of dissolved minerals from the mine openings. These conditions result in low risk of impacts to the R-aquifer and support the assumption that it is entirely possible for there to be no impact to R-aquifer water quality.


Page 4-67; Water consumption during mining is very small. Projections used in the impact analyses are for each mine to use 5 gpm for 4 years (life of the mine). The DEIS assumes that there would be a maximum of 20 mines operated during the 20-year period of analyses. These mines would likely be widely scattered over the areas north and south of the Grand Canyon. There will be no large-scale, long-lasting, concentrated areas of groundwater pumping.

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Bill  
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03/07/2011 03:31 PM

To Larry Martin/FTCOLLINS/NPS@NPS, Gary  
Rosenlieb/FTCOLLINS/NPS@NPS  
cc  
bcc  
Subject Re: Grand Canyon Uranium withdrawal DEIS 

Thanks, Larry. This is not a "shock" to me. Have you communicated your analysis to Kerry? I think your assessment comes across as professionally credible, and should be made available thru channels to the park. B

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Bill Jackson  
National Park Service Water Resources Division  
Sent from my BlackBerry Wireless Device  
mobile phone: 970-214-5870  
Larry Martin

----- Original Message -----

**From:** Larry Martin  
**Sent:** 03/07/2011 02:20 PM MST  
**To:** Gary Rosenlieb  
**Cc:** Bill Jackson  
**Subject:** Grand Canyon Uranium withdrawal DEIS

I won't be submitting comments regarding the DEIS for the proposed withdrawal of lands in Northern Arizona from uranium mining and exploration. My personal and professional opinion is that the potential impacts stated in the DEIS as grossly overestimated and even then they are very minor to negligible.

The DEIS goes to great lengths in an attempt to establish impacts to water resources from uranium mining. It fails to do so, but instead creates enough confusion and obfuscation of hydrogeologic principles to create the illusion that there could be adverse impacts if uranium mining occurred.

As an example, the ore bodies occur in association with the Hermit Formation and are about 1000 feet above the regional water table. Geologic formations between the ore body and the water table are primarily siltstone and mudstone of the Hermit Formation and Supai Group. These formations have very low permeability. There is no explanation for how potential contaminants might travel from the mine areas to the regional water table, but it is assumed that somehow that occurs and then contaminants flow many miles through the regional aquifer with no dilution, no degradation, and no concentration reduction. Even under those conditions, there is only a minuscule change in concentration of the most likely contaminants (arsenic and uranium) at the springs that discharge from the regional aquifer; and these changes are further diluted by mixing with surface waters downstream from the discharge areas.

Following are some of the important tidbits buried in the voluminous DEIS.

Page 3-57; The reason that ore deposits form in the breccia pipes is that the surrounding rock has very low permeability, which does not allow movement of groundwater through the mineral



Larry  
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03/08/2011 09:19 AM

To Julie Sharp/DENVER/NPS@NPS, Kerry  
Moss/DENVER/NPS@NPS  
cc Gary Rosenlieb/FTCOLLINS/NPS@NPS, Bill  
Jackson/FTCOLLINS/NPS@NPS  
bcc

Subject Comments re: DEIS for uranium withdrawal adjacent to  
Grand Canyon

It is my opinion that the DEIS grossly overestimates the potential for impacts to water resources of Grand Canyon National Park and the Colorado River from uranium mining and exploration on lands adjacent to the park. The reality is that the ore bodies are relatively small and isolated, surrounded by low-permeability geologic formations. It is unlikely that there could be any migration of dissolved minerals or other contaminants from mine sites, particularly via a groundwater flowpath.

\* Previous studies have been unable to detect significant contamination downstream of current or past mining operations, e.g. the Hack Canyon mines. (The exception to this statement is the Orphan Mine and Horn Creek. The Orphan Mine is an old, unreclaimed mine site at the south rim of the canyon. Water flows through the abandoned mine, flushing minerals into Horn Creek. This is in no way a suitable comparison to the hydrogeologic setting or conditions expected at potential mine sites evaluated in the DEIS.)

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There may legitimate reasons to be concerned about potential uranium mining operations in areas adjacent to the park, but adverse impacts to water resources is not one of those reasons.

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03/25/2011 04:54 PM

~~To~~ Bert Frost/WASO/NPS@NPS  
cc  
bcc Larry Martin/FTCOLLINS/NPS  
Subject Grand Canyon Uranium withdrawal DEIS

Bert: Gary Rosenlieb (Larry Martin's immediate supervisor) and I met with Larry this morning to discuss his opinion about the potential for contamination of park surface waters from uranium mining. In answer to your question, Larry had read the 66-page chapter on historic water chemistry in the "500 page" USGS report you had referred me to. Both Gary and I subsequently looked that chapter over, too. Here is a link to a 4-page USGS fact sheet summarizing the full USGS report:  
<http://pubs.usgs.gov/fs/2010/3050/fs2010-3050.pdf> The brief summary of "the Water Chemistry of Wells, Perennial and Intermittent Streams, and Springs" section of the fact sheet is worth reading.

The March 7 email which follows my note is from Larry Martin to me and Gary Rosenlieb explaining why he did not plan to submit further comments to the Uranium DEIS review process. He reproduces 10 specific statements in the DEIS that seem to support his basic premise that meaningful hydrogeologic connection between mine sites and park waters is highly unlikely. These 10 statements are worth reading. The USGS report and the DEIS both support the premise of impermeable geology between breccia pipes and regional aquifers. The USGS report then focusses on the results of historic water sampling in the region. Any samples with concentrations significantly above background were from perched waters in direct contact with the ore deposits (i.e., naturally high concentrations), or from perched aquifers in close proximity to mines. There was no evidence of high concentrations of arsenic or uranium at any distance from these 2 sources, and concentrations in the regional aquifer and in park waters were at regional background levels. As you would expect, USGS does not draw any conclusions other than that more "tracing" type studies would have to be conducted to determine if any arsenic or uranium in waters removed by distance from mined areas is human-induced.

Both Gary and I thought Larry could have better qualified his opinion by recognizing that while there is no evidence to date to contradict his conclusion, it would take additional sampling combined with chemical tracing to determine with even greater certainty whether contaminants stemming from mining have entered either the regional aquifer or springs entering the park. He also should probably have communicated his opinion directly to the park, rather than to the NRSS team involved in the DEIS review process. That being said, both Gary and I think Larry basically has it right, and that the information both in the USGS report and the DEIS support his generalized conclusion. There exists no information we could find that would contradict his conclusion, nor any hypotheses suggested as to how contamination of park waters might physically occur. Larry said that if presented with new information, he would willingly revise his "professional opinion." At our request, Larry called the USGS lead author of the water chemistry chapter to see if he would review and could concur with Larry's summary opinion. He basically said that the report was prepared under contract to BLM and speaks for itself, and he did not want to offer any personal opinions.

— This is obviously a touchy case where the hard science doesn't strongly support a policy position. Probably the best way to "finesse" this would be fall back on the "precautionary principle" and take the position that in absence of even more complete certainty that there is no connection between uranium mines and regional ground water, we need to be cautious?? It sounds like the DEIS is basically heading in that direction.

I suggest you, me, Larry and Gary talk next week? This way you can get a better feel for where Larry is coming from and we can discuss what we might do next. If you agree, I'll schedule a time with Stephanie.

Sorry if we've caused a bit of a ruckus here. I think the main mistake may be in how Larry's opinion has been communicated, not in the content of his opinion.

Bill