

**Ravenna Army Ammunition Plant  
Restoration Advisory Board (RAB)  
Meeting Minutes  
March 27, 2002**

**1. Call to Order and Reading of the Minutes**

The meeting was called to order by Lt. Col. Tom Tadsen at the Paris Township Hall, Paris, Ohio at 6:07 p.m. Secretary Denise Gilliam took attendance with 14 present, 6 excused and 3 absent (Mr. Milan Markov, Ms. Irene Glavies-Lutz, and Ms. Kerry Macomber). Lt. Col. Tadsen entertained the motion to suspend with the reading of the minutes, moved by Mr. Walter Landor and seconded by Mr. Tom Smith. Motion passed unanimously.

**2. Presentation of New RAB Member Applications**

Lt. Col. Tadsen introduced Ms. Nina Miller who discussed with the other RAB Members the current applications that she had received from applicants. There are two seats available on the RAB, Ms. Miller told the board and she is in possession of two applications. Ms. Miller stated that she had reviewed both applications and felt that the individuals would be good additions to the board. She told the board the names of the applicants, Ms. Sarah Piatt and Mr. Earl Miller. She then went on to read the highlights of each as stated on their applications. It was decided that there were not enough members present at this time for a quorum to vote on the applicants. Mr. Mark Patterson stated that it might be more feasible if copies of the applications were sent to each member and they in turn mailed back their vote, this was agreed upon by the rest of the board members that were present. A new representative for Charlestown was presented. He will be taking over for Mr. Edward Boles.

**3. Discussion of the Scientific Information on the Human Health and Environmental Effects of Arsenic.**

Col. Tadsen introduced Mr. Paul Zorko and Dr. David Brancato from the US Army Corps of Engineers, Louisville. Mr. Zorko took the floor first. He handed out flyers that depicted the draft summary of arsenic analytical results. Mr. Zorko pointed out on a map of the installation the different locations that were sampled for the study. The main constituent of concern being reviewed at was arsenic. They concentrated on the number of detections above the reporting level. Col. Tadsen asked Mr. Zorko to clarify what data points meant. Mr. Zorko replied that meant all samples including soil, water, sediment and soil boring samples taken at a specific location point. He advised the board to pay close attention to the footnotes on page four (4) of the handouts and then proceeded to turn the floor over to Dr. Brancato.

Dr. Brancato stated that his focus on the arsenic topic was directed at the installation. He stated that he went into the study to determine if there was any source of arsenic on the facility that could contaminate the groundwater. He reviewed soil and soil leachate parameters. He stated that there was no previous activity on the arsenal that would result in the groundwater being contaminated. Dr. Brancato further stated that there must be some naturally occurring source of arsenic in the ground that would account for previous detects. He emphasized to the members and the audience that dosage is what makes arsenic poisonous to humans. A toxic substance, he stated, must have an inherent "badness". People must be exposed to that substance at a certain frequency in order for that "badness" to affect them. He stated that arsenic is naturally occurring. It can be found in sulfide ores, Arsenopyrite and it accounts for four percent (4%) of the earth's crust. Arsenic can also occur from artificial sources. A typical example provided was

ceramic artists. Arsenic is found in dry clays, glazes and is released during kiln use. It can also be released by copper and lead smelters, and from the burning of charcoal. There are many occupations that have the potential to lead to arsenic exposure. Some of these include boiler operators, brass and bronze makers, dye makers, electroplaters, insecticide and rodenticide makers, herbicide makers, paint makers, leather workers, and wood preservative makers. Operations that cause dust release (grinding, mixing, blasting, and dumping) are subject to higher levels of exposure. Dr. Brancato stated that industrial processes use activated carbon to reduce or transform the substance to the less harmful variety of arsenic.

Dr. Brancato stated that even though soil can carry arsenic, there are certain chemical properties in the soil that retard the movement of the arsenic in the soil. This makes it difficult for arsenic to travel to the groundwater. The arsenic levels found on the arsenal are not sufficient enough to impact the groundwater. The soil on the installation is usually moist. The chemical process taking place in this damp soil combines with sulfur and other elements and retards the movement of the arsenic even further. He reiterated that after looking at the different processes performed on the arsenal there was never any known release of large amounts of arsenic. The numbers found there are usually hovering around background levels of arsenic.

Dr. Brancato went on to inform the RAB members of the health hazards associated with arsenic contamination. He stated that contact with the skin could cause irritation, burning, itching, and a rash. Breathing in arsenic can irritate the nose and throat. The symptoms of high exposure are poor appetite, nausea, vomiting, and muscle cramps. Arsenic is a carcinogen known to cause skin and lung cancer. He stated again that dosage makes the poison. You must have exposure, dosage, and frequency to a bad substance in order to elicit a bad effect. If a person has a single exposure to the substance they will not likely come down with the symptoms listed above. Our bodies have a healing effect.

Government agencies try to control exposure to arsenic of the general populace. OSHA, FDA, and Federal Drinking Water Standards place limits on what is considered to be a safe level of arsenic intake. The FDA started the study by looking at de minimis risk. If the risk is lower than the standard then it does not generally warrant public attention. If it is higher than the standards then steps are taken to reduce the level. He again stressed that dose makes the poison. A single exposure does not mean true contamination. The level of testing performed at the arsenal does not show that arsenic is traveling into or through the groundwater. He stated that he believes that there is a naturally occurring process that is responsible for arsenic levels in the groundwater around the arsenal. Dr. Brancato stated that the new OSHA standard is 10 ug/cu m averaged over an eight (8) hour period. The Federal Drinking Water Standard is 10 ug/L (effective in the year 2006). The FDA determined that for uncooked muscle tissue, the level should be lower than .5 ppm, for uncooked eggs .5 ppm, and for uncooked liver and kidneys .2 ppm. Mr. Tom Smith asked what effect, if any, did cooking the contaminated meat have on the arsenic. Dr. Brancato replied that the levels are controlled when you purchase food items from the market. Arsenic doesn't change it's form, so you must look at the levels in meat that is uncooked. Col. Tadsen asked if the levels given were the max exposure limit for the tissue. Dr. Brancato answered that it doesn't matter how much of something you eat, it is the frequency of exposure that is important. In their calculations the FDA does consider the normal consumption of the foods listed. An audience member asked for clarification on whether or not burning coal and evaporation of water were the only two sources of arsenic on the installation. Dr. Brancato replied that no information exists, with regards to the arsenal, related to any manufacturing process that would release arsenic on the facility. He noted that insecticides and herbicides release arsenic as well.

Col. Tadsen stated that he had a guest present who would discuss pesticide and herbicide applications on the arsenal after the rest of the presentations.

Dr. Brancato told the RAB that the magnitude of cancer risk, relative to site remediation goals, ranges from one in ten thousand to one in one million. This depends on the site, proposed usage, and the chemical of concern. The one in one million level of risk is often referred to as de minimis risk. Risks that fall below this range do not require attention. For carcinogens the risk assessment process uses animal data to predict the probability of humans developing cancer over a 70 year lifetime. Dr. Brancato closed his presentation.

**4. Discussion of Regional and State Data on the Distribution, Occurrence, and Origin, of Arsenic in the Public Water System.**

At this time Lt. Col. Tadsen introduced Mr. Michael Slattery of the Ohio Department of Drinking and Ground Waters of the Ohio EPA. Mr. Slattery introduced himself to the board and the audience members and stated that he works in the program development unit Columbus, Ohio. He works in water quality. They characterize groundwater, which is used by public water systems to be treated and then provided to the public. He stated that they test the water before it is treated and after it has been treated. He stated that his presentation would be primarily looking at arsenic on a statewide level. What do we see in terms of groundwater arsenic in the state of Ohio? How does surface water get mobilized to ground water? He stated that it was a rather complex issue and that geochemistry might help to explain it. We look at sampling data and try to see what relationships exist between the various bodies of information.

New arsenic rules have been established, and they are driven by health concerns. The standard has changed from 50 ug/L to 10 ug/L. This reduction will take effect in 2006. Understanding where the arsenic comes from will help us make good decisions. Statewide arsenic is a widespread phenomenon. Arsenic is the 20<sup>th</sup> most common element in the Earth's continental crust. It is more prevalent in volcanic regions. In northern Ohio arsenic occurs in most soil and rock materials. Mr. Slattery then stated that we need to examine whether or not if the chemical conditions here are conducive to the arsenic mobilizing to groundwater. He stated that it is not uncommon to have two wells close together exhibiting largely varied arsenic levels. Analysis suggests that redox controls are more important than lithologic or stratigraphic controls. Regional patterns do not support a surface source for the arsenic. The data that Mr. Slattery stated that he would refer to throughout the presentation were taken from two different sources, ambient systems and public water supply database. The ambient systems consisted of 214 wells that were used to test untreated water and the public systems were used to test treated water. There was poor electronic data for both means.

He then showed the RAB a histogram of mean ambient arsenic levels. Many sites, he noted, do not have any detectable arsenic levels. There are mainly three different types of aquifers, sand and gravel, sandstone, and carbonates. The sandstones are often found in the northeast portion of Ohio. He stated that being here, we are in the best spot possible for exposure to arsenic with the wells drilled in sandstone. The sites that are found to have arsenic levels higher than the new standard will have to do something to treat their sites. He told the board that about          of the samples for arsenic taken in sandstone are lower than the reporting levels. 1.6 is the mean for the sandstone systems. He showed the RAB a chart of the number of service connections. He reminded them of their own public water systems. The larger, he noted the system the lower the mean arsenic level. This is probably due to the volume effect of pumping.

At this point Mr. Slattery directed his presentation to this immediate region of Ohio. He showed the RAB members slides depicting the different counties in the area. Most of the values seen in the public water systems were rather low. He showed a plot of Trumbull County wells that were sampled by the county health department. He displayed a topographic map of the Newton Falls quadrangle. He pointed out two pods of data, one coming south of Braceville, and the other on State Route 82. The levels of arsenic are lower on State Route 82 than they are Braceville. Mr. JJ Leet pointed out that the area south of Braceville is very swampy. Mr. Tom Smith asked if there was a difference between the water in the reservoirs and the water found in the wells. Mr. Slattery stated that only groundwater was looked at, not surface water. This water was tapped into by wells. He then went on to state that the area was plotted even further by the use of glacial maps. He showed a digital rendering of the glacial aquifer system in Ohio. He noted that glacial drift thickness is also the same as till thickness. On the map, he noted that where the drift is thick it provides a cap over the aquifer and can produce reducing conditions. He showed where the Vaughn Elementary School was located on the slide. He stated that the glacial valley was probably once a river. He agreed with Mr. Smith that this area is very swampy. In this valley are the wells that were tested, and these wells more than likely tap into the bedrock. He stated that there are structural differences between the two different points. The valley is a buried valley left by receding glaciers, so the wells that had these high levels for arsenic are probably in an area with a reducing system.

Mr. Slattery told the board that there is a strong correlation between arsenic and iron as well as nitrates and arsenic. Where you have higher levels of iron you will more than likely also have high levels of arsenic. In contrast where you have high levels of nitrates you will have lower levels of arsenic. He stated that arsenic appears ubiquitous in all aquifer types. There is generally an increase in arsenic levels related to depth or reducing conditions. There is also generally a lack of elevated arsenic levels in known oxidized conditions. An increase in alkalinity supports a reductive scheme. In-phase changes of iron and arsenic suggest co-variation. He stated that arsenic derives from microbially mediated reduction of  $\text{FeO}_2$ , the oxidation of sedimentary organic carbon. He also noted that the distribution of elevated arsenic favors reduced carbonate and glacial sediment aquifer settings. Natural attenuation plays an important role. In the future, Mr. Slattery stated, we need to increase data sources with regards to arsenic, and acquire redox data. The types or variations of arsenic must be speciated. We must review and acquire whole rock arsenic data. And finally we must formalize reductive sequence models. Mr. Slattery stated that arsenic is naturally occurring and occurs everywhere. It is found most in glacial settings with reduced aquifers, like this area.

Mr. Slattery closed by giving the RAB and audience members the web site for the EPA: <http://www.wpa.state.oh.us>. Requests for ground water quality data can be obtained by [gwq@epa.state.oh.us](mailto:gwq@epa.state.oh.us). He also handed out a flyer entitled: Arsenic Facts for Public Water System Customers. All RAB members receiving the minutes will have this handout attached.

Mr. Slattery then introduced Ms. Diane Kurlich to the RAB. She showed tables of public water supply wells in NE Ohio that have detectable arsenic concentrations. She stated that levels of arsenic vary geographically. She discussed several wells in Portage County. She stated that most of the public water supplies in this area are in sand and gravel. She stated that the Ohio EPA conducted sampling at various locations around the arsenal. Thirty-five residential wells were sampled around the perimeter of the arsenal. Arsenic was one of the analytes being examined. She then showed the RAB a listing of the street names that had wells that were tested. She noted that 24 of the wells had detectable levels of arsenic. The levels ranged from 2.9 ug/L to 65.8 ug/L. The average of all the wells tested was 12.8 ug/L and the median value was 9.4 ug/L. Out of the 24

wells, two of them were in sand and gravel, eleven were in sandstone and 11 had no well logs. The total depth of the wells ranged from 40 to 215 feet. In order to show the RAB that levels of arsenic do indeed vary geographically she noted that the well with a level of 65.8 ug/L was next door to the well with 4.0 ug/L and across the street from the house that had a level of 7.0 ug/L. At this point Ms. Kurlich closed her presentation and the floor was opened for questions. Lt. Col. Tadsen stated that Mr. Tim Morgan developed the pesticide management plan that is currently undergoing approval. He asked Mr. Morgan how arsenic relates to pesticides. Mr. Morgan replied that historically the facilities uses more herbicides than pesticides. The DoD in 1993 issued a measure of merit to reduce the use of these chemicals by 50 percent. That is still the goal, to reduce where there can't be eliminated completely. Mr. Morgan stated pesticide usage at the facility has been reduced drastically. Since 1988 no pesticide or herbicide has been released onto the arsenal as far as he can tell. He stated that Roundup® is the most commonly used herbicide used inside the fence and on any DoD property. He stated that there are firm restrictions on who can apply chemicals and the chemicals themselves are all EPA approved. A log is kept recording where and how much of the chemical is applied. He stated that they are trying to run a tight ship. They only keep a 90-day supply of pesticides and primarily it is just wasp and bee spray. Everything is recorded, inventoried, and kept in a locked cabinet. He then asked the board if they had any questions. There were no questions.

Mr. Walter Landor told Mr. Slattery that in Trumbull County there is a flood plain and the soil is very complicated. Mr. Slattery replied in the affirmative to the soil being complex. He stated that most metals get locked up when they move through the soil. Ms. Marti Long asked about home water softeners. She stated that seeing as iron and arsenic co-vary do the softeners treat the arsenic in the water as well as the iron. Mr. Slattery replied that they do not, seeing as they exchange calcium and magnesium for sodium. He stated that a reverse osmosis unit might help to lift iron from the water.

**5. Additional Business**

During the meeting a quorum was reached so the board members voted for the RAB applicants. Both, Ms. Sarah Lock and Mr. Earl Miller were selected to join the board.

**6. Scheduling of Next Meeting**

The next meeting was scheduled for April 24, 2002 so that the board members could be informed about the upcoming Interim Removal Actions at various sites on the arsenal. The meeting will be held at the Freedom Township Hall from 6:00 p.m. to 8:00 p.m. At this time Lt. Col. Tadsen adjourned the meeting.

Respectfully Submitted,

Denise L. Gilliam  
Secretary, RAB

DG/dg