

**Ravenna Army Ammunition Plant
Restoration Advisory Board (RAB)
Meeting Minutes
June 26, 2001**

1. Call to Order and Reading of the Minutes

The meeting was called to order by Lt. Col. Tom Tadsen at the Paris Town Hall, Paris, Ohio at 6:04 p.m. Secretary Denise Gilliam took attendance with 12 present, 6 excused and 6 absent (Dr. Jay Abercrombie, Mr. Floyd Banks, Mr. Edward Boles, Mr. Robert Daughtery, Mr. J.J. Leet, and Mr. Milan Markov). Lt. Col. Tadsen made the motion to suspend with the reading of the minutes, so moved by Mr. Walter Landor and seconded by Ms. Becky Carter. There were no changes to the minutes.

2. Review Comment Report on the Biological Field-Truthing Effort at Winklepeck Burning Grounds by URS

Lt. Col. Tadsen introduced Ms. JoAnn Bartsch and Dr. Bill Parland of URS. Ms. Bartsch stated that the purpose of the night's meeting was to give URS a chance to present the results of the Army's biological field-truthing effort. This study was originally conducted in April 2001. She stated that this study was conducted due to the fact that screening predictions suggest harm or risk even though there appears to be a healthy environment. Ms. Bartsch gave the board a review on statistics. Four statistical elements were looked at in this study; Alpha, Beta, variability and a 20% significant difference. The probability was set at 0.05 percent. The alpha of 5% was used. This expresses confidence. For example, "There is a 5% chance we'll say things are different when they are not." The beta or power is at 95%. This expresses the consequences of making a wrong decision or saying things are the same when they are not. Significant difference is a difference that is considered important. The variability is the spread of values observed when taking samples. These statistical rules are established by the Army. Ms. Bartsch stated that throughout the review she would be saying that something was or was not statistically significant. She explained to the RAB that they should look at the phrase as being a 5% chance that a difference is due to chance rather than chemicals in the soil or there's a 95% chance that the difference is real.

Ms. Bartsch stated that SAIC's report was broken into four separate parts; vegetation, mammals, soils, and extrapolation. Extrapolation is the process of using the information gathered at Winklepeck and applying it to other areas on the arsenal.

The first topic that she addressed was the vegetation results. The findings indicated that there were no statistically significant differences between the burn pad sites and their respective reference sites. Ms. Bartsch presented the results of the study as follows:

Species Richness (number of plant species)

- 109 different species were identified
- 43 non-native or exotic species were identified as well as 66 native plant species.
- Interestingly enough pads 58/59 and 66/67 had more species than their respective reference sites.

- However, the differences were not statistically significant.
- Stem Density (number of individual plants)
- Average number of plants ranged from 1,000 to 2,000
 - The measured difference were small, less than a percent
 - There were no statistically significant differences observed
- Biomass (weight of harvested above-ground plants)
- The lowest weight was found at reference site E2 and the highest at pads 66/67
 - The measured differences between the pads and the reference sites were lower than 20%
 - Pads 37/38 had much higher weights than their reference area. This was an unexpected find.
 - However, there were no statically significant differences between the pads and the reference areas.
- Community Composition
- Calculated a diversity index to measure how evenly plants are divided among the species
 - There were no statistically significant differences observed
 - Measured the percentage of exotic or non-native stems
 - The percent of exotic species at 58/59 and 66/67 were more than twice as high as re reference sites. This difference was statistically significant
 - The conclusion in the report is that this not necessarily due to chemical contamination but disturbance history

Dr. Parland took the floor at this time to discuss URS' comments on how well the vegetation study was performed. He stated that a lot of time and effort was put into the study to make it a scientifically sound study. He stated that it was well implemented and comprehensive. He stated that there is a precedence for this work. He, himself, has conducted studied streams and waterways using similar methods. For the work that he performs there is an established protocol. Dr. Cornaby is trying to develop and establish a set of protocols for field and ground truthing in terrestrial environments like there is for water. The purpose of the study was to determine whether or not the chemicals at the site were having an adverse effect on the vegetation. Screening risk assessment implies that there will be.

One problem with the study is that the reference areas chosen were not tested for contamination in their soils. There is a history of soils being moved around on the arsenals, spills may have occurred that were not documented, etc.. The study would have been stronger if the reference sites had been tested, that way it would have guaranteed that a clean site was being compared with a known contaminated site. A lot of assumptions had to be made in order to continue with the study as it stood. Another factor that should have been looked at is the chemical sensitivities of the plants. He stated that without knowing these properties it would be difficult to make statements about whether or not change truly occurred. Some species are really good at living in disturbed areas. There are two different types of stress that could effect plant life; chemical and physical. We need to be able to establish which one is causing harm. The study was limited to herbaceous or non-woody vegetation, this opens up the possibility that the study may not fare well if conducted using other vegetation such as brambles or roses, etc.. Some of the plant measurements that were taken may not be independent of each other. There could be a cause and effect relationship. Measurements for biomass and stem numbers, for example, could be linked. Dr. Parland stated that the different

species at the burn areas could be linked to toxic stress but the differences in the pioneer species could simply be linked to chance seed distribution. At this point Lt. Col. Tadsen asked Dr. Parland to define pioneer species. He replied that if an area is disturbed and nothing is done to correct it there will be certain weeds that will get into those areas. They are the first things to take over and generally the exotic species are pioneer species as well. Mr. Lester Gourley asked if there were any rosebushes in the areas studied because they have a tendency to flourish under all kinds of conditions. Dr. Parland replied in the negative and stated that he didn't think that the study would have been effective if there had been. Ms. Kerry Macomber asked if the reference areas could be checked for the presence of chemical contamination at this point and Dr. Parland replied in the affirmative. An audience member stated that he agreed with the criticisms and asked if perhaps because the metals have leached down into the soil and have left behind clean top soil that is why the pioneer species are taking off. Dr. Parland stated that some were able to survive and flourish in all types of environments. Ms. Bartsch stated that (in further answer to Ms. Macomber) if chemicals were found in the reference areas that would destroy the whole hypotheses.

URS next looked at the mammal portion of the study. The study had measured:

- Species Richness or the number of species trapped
- Abundance or how many individuals of a species were trapped.
- Weights of the trapped animals including liver, body, epididymis and testes
- And the reproductive potential of two target species, in other words their ability to propagate is found by measuring their sperm count, shape and movement of sperm

A total of 152 animals were captured. 56 were caught at the burn pads and 96 were caught at the reference sites. Six species were identified at the pads and eight were identified at the reference sites. 14 adult males were utilized for sperm tests; six from the pads and eight from the reference areas. URS included a table from SAIC's report that showed the mammal trapping results. This table identified the animals that were collected and the location they were found. Meadow voles were the target species, but since 22 were found on the burn pads and only four were found in the reference areas the study was shifted to the white footed mouse. Dr. Parland stated that the report did not explain why this change occurred and what effect that it may have had on the study. The conclusions for the study were now based on the white-footed mouse. There are differences, however, between the two. The main difference is that voles are strictly plant eaters and the mice sustain themselves on a diet of worms and plants. A cause and effect linkage to the food chain was missing from the report. Chipmunks were not found on the burn pads, but were located at one of the reference sites. The cause for this is the fact that the reference site is surrounded by acorn producing oak trees but the burn pad area is devoid of them. Short tail shrews were not found at the pads but 17 were located at the reference areas. Shrews only eat worms or bugs, this fact asks the question why are they not at the pads. Could it be that there are not a sufficient number of insects and worms on the pads due to chemical contamination or simply a matter of incorrect site selection? Although the study was designed specifically to trap the mice and moles, all of these other factors are identified. Dr. Parland noted that the hydrology could be different between the pads and the reference sites. Flooding occurred in various reference areas, so this could explain why the voles were missing. There were not enough target animals collected for the study and because of this the animal data was pooled together. None of the reproductive measures were statistically

significant between the combined burn pads and the combined reference sites. Please note that the study was designed originally to collect data from a set of pads and a sister reference site for each. The liver weight of the mammals was statistically significant, but not when the body weight of the individuals was considered. At this point Mr. Walton commented that the report states that the mice at the burn pads have bigger livers, yet this is not considered significant because they are bigger mice, then the question should be why are the mice bigger at the burn pads? Ms. Bartsch stated that she did not feel that the size of the mice on the pads in comparison to the reference sites was significantly different. Mr. Walton said that when he read it he understood it to mean that the livers are significantly bigger but the size of the mice is not, why is that? Dr. Parland stated that he questioned this as well but suggested that it was probably due to the small sample size. Ms. Bartsch added that it might also be due in part to the fact that the data was pooled, which devalues the study. Dr. Parland interjected that the chemical testing of the liver tissues should have been performed as well. All in all the results of the trapping indicate that there may be differences in habitats or toxicity between the reference sites and the Winklepeck sites. Dr. Parland stressed that the goal for the number of samples was not met so now the comparison is between the combined burn pads and the combined reference points. He noted that subtle changes in the amount of mouse sperm, do not necessarily signify reproductive impact for the mice. Mice have the ability to produce huge amounts of sperm, as much as ten times more than they actually need. Due to this, even small changes in the amounts is not considered significant. He stated that the female reproductive system of mice might be affected as well, but this was considered. All in all the results are a little fuzzy.

At this point URS moved on to the soil portion of the study. 30 soil surface samples were collected from plots within the Winklepeck burn pads representing a range of vegetative cover percentages. The soil was sampled from 0-1 foot in depth. The sampled areas included lush, sparse and bare spots. The soils were analyzed for a group of chemicals that included explosives and metals. The latter two were found, as was to be expected. Semi-volatile organic compounds were also discovered. Most of the explosives found were on pads 66/67. There were almost none found at pads 58/59. The important thing to note here is that the data was pooled. Most of the inorganics that were found were above site-wide background concentrations. Some inorganics such as antimony, barium, copper, cyanide, lead, manganese, mercury and zinc can be correlated with the presence of explosives. Some polyaromatic hydrocarbons (PAHs, by-products of combustion) were detected primarily at pads 66/67. Please note that PAHs can be found on any household charcoal grill.

URS then discussed plant and chemical/soil correlations. Please note the following definitions:

Correlation: how one measurement changes with another measurement

Regression: a mathematical equation that allows estimates of one measurement to another.

Cyanide and TNT were correlated with plants for four metrics: percent cover, species richness, stem density and biomass. They were negatively correlated as concentrations went up and the number of plants went down. HMX and TNB were similarly correlated for several metrics. The higher the levels of HMX, the lower the number of species and diversity. The higher the levels of TNB the

lower the rates of richness and cover. PAHs were not negatively correlated. There were some weak positive correlations. Metals could not be examined.

Using the results of this study environmental protection levels (EPLs) were calculated. They are as follows:

Cyanide: 0.35 mg/kg (also termed as ppm or parts per million) based on percent cover
TNB: 8.7 mg/kg based on percent cover
TNT: 386 mg/kg based on percent cover
HMX: 97 mg/kg based on species richness

For other chemicals, historical data were used to calculate EPLs. Dr. Parland stated that the calculations of EPLs may be premature due to the fact that the reference areas were not tested for chemicals. The burn pads and reference sites can be related together or show correlations. Dr. Parland also stated that the issue of bioaccumulation of chemicals in plants and animals remains unaddressed, this goes for plants as well as animals. Without testing for concentrations of chemicals in the tissues of the mammals or worms one can only speculate that bio-accumulation is going on. He stated that foxes and hawks were not used in the study due to their large home ranges, so bioaccumulation would not have an effect, but due to the smaller ranges of the voles and mice, bioaccumulation in their tissues should be more closely examined.

Dr. Parland stated that the mathematical calculations were not sufficiently conservative. Ms. Bartsch stated that the members of the study calculated a number and attached a confidence number to it in a way not normally seen. She stated that they took the upper confidence level. They were more liberal than conservative. She stated that they were calculating something that is nonsensical. Mr. Walton stated that if the samples were run with a tighter probability level maybe the results would be different, since the samples were so small.

Ms. Bartsch gave the Army's conclusions for extrapolation of the data found in the study to other areas on the arsenal. He stated that high concentrations of explosives are associated with low percent cover and low species richness for vegetation at the studied plots. This small amount of effect has no real meaning in larger area. Statistical significance was demonstrated for only a number of exotic species. Exotics have little meaning in terms of a functioning vegetation community. Information on plot scale can be applied, however, to other larger areas.

At this point Ms. Bartsch directed the RAB members to refer to two flow charts in their presentation handout (Figure 9.9 and 9.10). The charts are entitled Risk Assessment Decision-Making Process and Risk Management Decision-Making Process. URS' commented that methodology issues need to first be resolved before this process begins. Their main comments were that historical records are often incomplete. There is no information about what the Ohio EPA's screening levels are and that a comparison of means should be used, or the 95% lower confidence limit be utilized.

In closing, URS stated that the study was a great start. The methodology has a firm basis in aquatic ecological risk assessments, but now we need to establish the methodology for terrestrial ecological risk assessments.. They stated that the Army did what it said they were going to do and implemented the study. They

also suggested that the trapping success was just bad luck, due primarily to inclement weather. Their main concern was over the methodology utilized. Have all bases been covered?

Ms. Bartsch then asked the RAB what they wanted URS to do. She asked whether the RAB felt that further discussions were warranted. She stated that comments on behalf of the RAB were due to the Army on July 11th. Ms. Macomber asked what happens after July 11th. Mr. Patterson responded that the comments will be submitted to the team that worked on this project. They will get to see URS/RAB comments as well as internal comments. They will then come up with responses. He stated that the RAB was at the beginning of this process. He stated that internally they have wrestled with a lot of the same issues. Mr. Gourley asked if we should continue to spend TAPP money on these studies or should we stop. Mr. Patterson stated that these studies are basically ecological. There are other studies and work that can be done. Lt. Col. Tadsen stated that there are other agencies involved in this review process. They will also provide comments. He went on to say that the comment resolution process itself is very effective. Ms. Bartsch added that not everyone sees things in the same way. Everyone comes from different backgrounds and specialties so we see things differently. Mr. Walton asked if there was a null hypotheses formulated for the study. Ms. Bartsch replied that she had not seen one. Mr. Walton stated that he believes that they should be more conservative and there should be more samples taken during different seasons and they should include different areas of study such as deer and worms. He also stated that tissue samples need to be taken. Lt. Col. Tadsen said that these things were all taken into account when the study was designed. He said that one of the limiters of the process is the budget and the other is the extent of the remediation which the taxpaying and resident public wants. Ms. Bartsch stated that a balance between the extent of remediation and cost should certainly be established. Mr. Patterson stated that it was best if the RAB began by submitting their own comments as individuals. These comments are due to URS by July 6th. They can arrive either by email or the postal service.

URS closed their presentation at 7:35 p.m..

3. Additional Business

Ms. Nina Miller informed the board that there was a new applicant for the board. She read from her application the individual's qualifications. It was determined that according to the charter there has to be a majority vote so voting was put off until the next regularly scheduled meeting. Mr. Patterson stated that normally every summer the RAB is given a tour of the new projects on the arsenal. All RAB members are invited to contact Mr. Patterson if they are interested in attending, the date and time will be determined based upon interest. The date of the next meeting will remain September 19, 2001 at the Windham Town Hall. There being no further business Lt. Col. Tadsen adjourned the meeting at 7:46 p.m..

Respectfully Submitted,

Denise L. Gilliam
Secretary, RAB

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