



Kerry Howe, *Chair*
Russell Pederson, *Vice-Chair*
Suzanne Busch
Julia Maccini
Roland Penttila

John Pietz
Roberto Roibal
Caroline Scruggs
Jennifer Thacher

Water Protection Advisory Board
c/o ABCWUA
P.O. Box 568
Albuquerque, NM 87103

Minutes: October 12, 2018
Location: Bernalillo County Public Works Division, 2400 Broadway SE, Bldg. N Conf. Room
Time: 8:30 to 10:30 a.m.

Board Members Present: Chair Kerry Howe, Suzanne Busch, Julia Maccini, Roland Penttila, John Pietz, Roberto Roibal, and Jennifer Thacher

Board Members Absent (excused): Vice Chair Russell Pederson and Caroline Scruggs

PIC Members Present: Bart Faris, Ken Ziegler, Diane Agnew, Kate Mendoza, Liz Anderson, and Dan McGregor

Guests: Dennis McQuillan (NMED), Kate Lynnes (U.S. Air Force), Dave Rast, and John Copland (Sandia National Labs)

I. Call to Order

Chair Dr. Kerry Howe called the meeting to order at 8:30 a.m.

II. Approval of Agenda

Chair Howe requested a motion to approve the agenda. Mr. Roland Penttila motioned to approve the agenda and Ms. Suzanne Busch seconded the motion. Motion to approve the agenda carried unanimously.

III. Approval of August Minutes

Chair Howe asked board members if there were any comments on the September meeting minutes. Mr. Penttila moved to approve the September minutes with no changes and Mr. Roberto Roibal seconded the motion. Motion to approve the September meeting minutes carried unanimously.

IV. Board Business

a. PIC Agency Updates

Mr. Bart Faris, PIC member, told the board that the City of Albuquerque (City) has been preparing the Los Angeles Landfill site for recreational vehicle parking for the 2018

International Balloon Fiesta. Mr. Ken Ziegler, PIC Member, shared that there are many recreational vehicles parked on the landfill for the Balloon Fiesta this year.

Mr. Faris told board members that there was a Mid-Region Council of Governments (MRCOG) Executive Board meeting on October 11th where there was discussion about the letter written by the Water Protection Advisory Board (WPAB) encouraging the MRCOG to develop a template for oil and gas ordinances in the Middle Rio Grande. The MRCOG Executive Board decided to pass a resolution recognizing the need for an oil and gas ordinance template and will present the resolution to the MRCOG Full Board in November. Mr. Faris said that upon approval of the resolution by the MRCOG Full Board, the task of developing a template for oil and gas ordinances will likely be delegated to the MRCOG Water Resources Board.

Ms. Diane Agnew, PIC member, told the board that the Water Authority's source water protection plan, the Rivers and Aquifers Protection Plan, will be posted as a draft and available for public comment on Monday, October 15th. She told board members that the Water Authority hopes to finalize the document by the end of the year. Ms. Agnew told board members that the Water Authority will be working on developing its Environmental Plan this year. She told the board that the Environmental Plan will identify projects to help implement the policies outlined in *Water 2120: Securing Our Water Future*, the Water Authority's 100-year water resources management strategy.

Ms. Agnew told board members that there will be a public showing of the film "Sacred Land, Sacred Water: Confluences in the Rio Grande Valley" at the Kimo Theatre on October 14th at 2:00 p.m. and will be followed by a panel discussion and Q&A session with the producers.

Mr. Faris told board members about the upcoming New Mexico Environmental Health Association Conference which will be at the Pueblo Cultural Center on October 23rd and 24th, 2018.

Mr. Penttila asked about board member appointments and Ms. Agnew said that she had a few updates. Ms. Agnew said that Dr. Jennifer Thacher's appointment has ended and Dr. Thacher is filling in on the board until the Water Authority fills her spot. Ms. Agnew said that Dr. Caroline Scruggs' appointment has ended and Bernalillo County (County) has identified two possible candidates to fill her position. Ms. Agnew said that Vice Chair Mr. Russell Pederson's first term will be ending in December and the City had asked if he would serve a second term.

V. Presentation: *Overview of Environmental Restoration Activities and Tijeras Arroyo Groundwater Conceptual Model and Corrective Measures Evaluation*

Mr. David Rast, with Sandia National Labs (SNL), started his presentation by telling board members that the Environmental Restoration program at Sandia National Labs started 20 years ago and has since identified 315 sites needing corrective action and remediation. He told board members that SNL has completed corrective action at 309 of the 315 environmental sites and only six sites are still being remediated. Of the six sites, Mr. Rast

said that three sites have been cleaned up, but have deferred corrective action because SNL has not yet filed for site closure with the state. The remaining three sites are groundwater areas of concern and include the Burn Site, Technical Area V (TA-V), and Tijeras Arroyo.

Mr. Rast told the board about the Burn Site where SNL conducted testing activities for explosives and fire survivability starting in 1967. Mr. Rast said that the Burn Site has nitrate contamination above the maximum contaminant level (MCL) of 10 milligrams per liter (mg/L). He also said that it has been difficult to determine groundwater flow direction at the Burn Site due to complex hydrogeology and groundwater occurring in fractured bedrock. Mr. Rast showed the board a map of the estimated nitrate concentration contours for the Burn Site and Chair Howe asked if the map was showing two different contamination locations at the site. Mr. Rast clarified that there are two hot spots for nitrate contamination at the Burn Site and the SNL has been unable to determine if the two hot spots are physically connected or not. Mr. Roibal asked what was burned at the Burn Site and Mr. Rast said that there was open-air burning of chemicals and jet fuel, including diesel, to test containers for transport of nuclear materials. Mr. Rast further clarified that burn tests are now conducted indoors at SNL buildings and that the Burn Site, which was operational from the 1950s to the 1980s, is no longer used. Mr. Penttila asked if the Burn Site was a Resource Conservation and Recovery Act (RCRA) permitted site and Mr. Rast responded that all SNL environmental sites are managed under RCRA permits. Mr. Rast told the board that SNL is conducting semi-annual groundwater monitoring at the Burn Site and they are currently preparing a work plan for four additional monitoring wells as requested by the New Mexico Environment Department (NMED).

Mr. Rast told board members about groundwater contamination and remediation activities occurring at TA-V. Mr. Rast said that testing activities at TA-V occurred from 1961 to 1990 and included the use of research reactors (nuclear reactors that serve as a neutron source). He told board members that there are 18 wells to monitor groundwater contaminated with nitrate and trichloroethylene (TCE). Mr. Rast said that there are low levels of nitrate and TCE contamination with nitrate concentrations around 12 mg/L and TCE concentrations of around 17 micrograms per liter (µg/L). Mr. Rast showed the board maps of estimated contamination plume footprints for both nitrate and TCE contamination at TA-V. Mr. John Pietz, board member, asked if the source of contamination has been removed from TA-V and Mr. Rast replied that it has.

Mr. Rast told board members that SNL completed a phased treatability study to test the effectiveness of in-situ bioremediation of groundwater at the TA-V site and received favorable results. Based on the results of this pilot study, SNL will go full-scale with the in-situ bioremediation. Mr. Rast said SNL has received a discharge permit from NMED and plans to start injecting bacteria and nutrients via the injection well next month. Chair Howe asked if they were planning to pump and treat any of the contaminated groundwater and Mr. Rast replied that they did not need to pump and treat. Chair Howe asked about the area of influence for the bacteria and if SNL has modeled the preliminary results and Mr. Rast said that they have done modeling for the site and admitted that the area of influence for the bacteria was likely not going to be as large as they had hoped. Dr. Jun Li, the project manager for the TA-V site, added that the aquifer at TA-V is not very productive and they were pleased to see the injected water went into the aquifer without mounding within

the well during the pilot study. Dr. Li also noted that there are anaerobic conditions present in the aquifer to allow for bioremediation of TCE and SNL will be monitoring for several parameters, including the bacteria population size, to determine whether the full-scale in-situ bioremediation is successful. Mr. Penttila asked where the bacteria comes from and Mr. Rast replied that *Dehalococcoides mccartyi* are proprietary bacteria and are supplied by a contractor. Mr. Pietz asked what type of nutrients and food for the bacteria would be injected, and Mr. Rast replied that they will be injecting ethyl lactate as a food source for the bacteria.

Mr. John Copland with the SNL Environmental Restoration program presented information on the Tijeras Arroyo Groundwater (TAG) area of concern on Kirtland Air Force Base (KAFB). Mr. Copland told board members that the TAG area of concern is about 1.8 square miles and the perched aquifer has nitrate contamination. Mr. Copland said that TCE has been detected in the perched aquifer but concentrations of TCE have reduced to concentrations below the MCL and NMED is no longer requiring SNL to evaluate the TCE plume. Mr. Copland said that SNL submitted a Revised TAG Current Conceptual Model and Corrective Measures Evaluation to NMED in February 2018.

Mr. Copland showed the board the conceptual site model for the TAG site and said that groundwater flows in a southeasterly direction at the site. Mr. Copland said that SNL has installed 31 groundwater monitoring wells and 14 soil vapor monitoring wells at the TAG site and has been monitoring groundwater at the site since 1992. Chair Howe asked about water leakage from the perched aquifer to the regional aquifer and Mr. Copland replied that about 75% of the water from the perched aquifer migrates to the regional aquifer. Mr. Copland provided the board with details of the perched and regional aquifer properties and showed maps of the potentiometric surfaces for the TAG site. He explained that groundwater levels have been declining in the perched aquifer for the last 20 years and that SNL has modeled the perched aquifer dewatering; the model looks at the perched aquifer water levels through 2050.

Mr. Copland discussed the potential release sites at SNL and KAFB that may have contributed to the TAG contamination. Mr. Copland said SNL reviewed 47 solid waste management units and identified two sites that are suspected to have impacted groundwater in the perched aquifer: 1) Old acid waste line outfall that was used from 1948 to 1974 and 2) Septic systems at Technical Area II that were in place from 1948 to 1992. He said that both discharges have been eliminated from the site. Mr. Penttila asked if the nitrate contamination is a result of SNL operations and Mr. Copland responded that the source of contamination is likely from SNL and KAFB operations over time but reiterated that there are no current or potential threats to drinking water in the area. Mr. Copland showed the board maps of 2017 nitrate concentrations in the perched and regional aquifers and said that the regional contamination is likely from the KAFB golf course. Mr. Copland pointed out the Albuquerque Bernalillo County Water Utility Authority (Water Authority) wastewater interceptor lines that go through KAFB and said that the wastewater line could be source of nitrate contamination for the perched aquifer. Ms. Agnew said that the Water Authority has recently completed video of those wastewater lines and that if KAFB has requested the video, that it would be provided following internal review. Mr. Pietz asked if there has been any upgradient controls of the nitrate sources and Mr. Copland replied that there are other monitoring wells upgradient that are not shown on the diagram. Mr. Copland

discussed potential sources of nitrate contributing to the contamination and included KAFB former sewage lagoons, KAFB golf course, and Water Authority wastewater line breaks from 1994 and 2003. Ms. Agnew clarified that the 2003 wastewater line break was a pipe collapse and did not result in ponding at the surface and the 1994 wastewater line break had immediate response with surface ponding limited to a few days while the repairs were completed. She also clarified that neither the 1994 or 2003 wastewater line breaks resulted in 100,000,000 gallons of ponding at the surface as previously claimed by KAFB.

Mr. Copland said that SNL has proposed monitored natural attenuation as the preferred alternative for remediation at the site. He added that SNL has done analysis and modeling for two alternative remediation techniques, groundwater pump and treat and in-situ bioremediation, should natural attenuation prove to be insufficient. Dr. Jennifer Thacher asked about the remediation time frames and SNL has a 20-year or 40-year remediation goal and Mr. Copland said they are clarifying that timeline with NMED. Mr. Copland added that they do not factor in cost of remediation when selecting an alternative for remediation. Mr. Copland said the other alternative remediation technologies were developed to remediate the nitrate contamination in 20 years and the monitored natural attenuation strategy was estimated to meet remediation goals in 40 years. Mr. Copland added that he estimates the perched aquifer will be dewatered in 5 to 30 years and the only area of the perched aquifer that will remain saturated will be the area immediately under the Tijeras Arroyo. Mr. Faris asked about the upcoming public meeting SNL and the Department of Energy will be hosting to talk about their environmental restoration sites and Mr. Copland replied that the meeting will be at the African American Performing Arts Center on October 23rd at 6:00 p.m. and there will be posters and staff available to answer questions.

VI. Presentation: *Kirtland Air Force Base, Bulk Fuels Facility Jet Fuel Leak Project Update*

Mr. Dennis McQuillan, Chief Scientist at NMED, provided an update on the KAFB Bulk Fuels Facility (BFF) jet fuel leak project and discussed the progress and status of remediation at the site. Mr. McQuillan told the board that BFF project staff will be hosting a field trip to Tijeras Arroyo and the groundwater treatment system on October 20th from 11:00 a.m. to 1:00 p.m. to look at examples of sand and gravel deposits that are the host material for the Albuquerque Basin aquifer. Mr. McQuillan told the board that he would review the 2018 Strategic Plan (Plan) and Ms. Kate Lynnes with the Air Force will be presenting how the Air Force is meeting the goals set by the Plan.

Mr. McQuillan told board members that the goal of the BFF project is to, “protect Albuquerque’s aquifer and drinking water supply wells in the area of the fuel leak” and NMED identified four strategies in 2018 to meet that goal. Mr. McQuillan said that the first strategy was to implement robust site monitoring and wellhead protection. He told board members that there have been no detections of ethylene dibromide (EDB) in any drinking water wells or sentinel wells (early-warning wells). Mr. McQuillan said that the Air Force is working on developing a capture analysis model to help understand the effectiveness of the groundwater extraction and treatment system in capturing the dissolved-phase EDB plume. Mr. McQuillan also said that the Air Force recently started drilling soil cores in the source area to fill a data gap and to understand the extent of the light non-aqueous phase liquid (LNAPL) present in the ground below the source area.

Mr. McQuillan showed board members the site conceptual model and said that it would be updated this year. He said part of the updates to the conceptual model would include defining the effect of the rising water table on residual LNAPL in the saturated and unsaturated zones and identifying the degradation processes occurring and potential opportunities for enhancement through engineered cleanup technologies. Mr. McQuillan said that the jet fuel started leaking from the BFF in the 1950s and there is uncertainty around when the jet fuel reached groundwater at the site. He told the board that the rising water table is a result of the Water Authority's switch to utilizing San Juan-Chama water instead of solely using groundwater and the switch has been great for water resources for Albuquerque but has presented a challenge for the BFF project. The rising water table has drowned most of the monitoring well network and has likely resulted in smearing of the residual LNAPL in the subsurface. Mr. McQuillan said that the site is very complicated and must utilize multiple technologies for cleanup. He said that methanogenesis is likely occurring in the source area and that a low level of nitrate occurring near the fuel plume could be a result of hydrocarbons that have been oxidized by bacteria over the years. Mr. McQuillan said that EDB hydrolysis is occurring at the site. Mr. McQuillan said that there is degradation occurring in the source area where the EDB and LNAPL are comingled. He said that the Air Force is currently conducting an in-situ bioremediation pilot study to understand the bacteria present at the site and to determine the extent of bacterial degradation. Mr. McQuillan added that the Air Force has not found the *Dehalococcoides* bacteria, but they did find other species of dehalogenating bacteria present at the site. Mr. McQuillan reiterated the need to continue identifying engineered opportunities to accelerate biological degradation occurring at the site.

Mr. McQuillan told the board that the third strategy in the Plan was to deploy multiple engineered cleanup technologies. He also discussed the cleanup technologies utilized at the site over the years. Mr. McQuillan said that the Air Force has recovered over 700,000 gallons of fuel from the site. He said that the surrounding community demanded that interim measures were taken to clean up the EDB plume to prevent drinking water contamination and a groundwater extraction and treatment system was installed at the site. Mr. McQuillan said that the groundwater pump and treat system is collapsing the EDB plume. Mr. McQuillan told board members the Air Force had plans to do bioaugmentation of bacteria found at the site by injecting *Dehalococcoides* bacteria into the aquifer as part of the in-situ bioremediation pilot test but have postponed the bioaugmentation phase of the pilot test because of current success with injecting food for the existing bacteria to encourage EDB degradation. Mr. McQuillan said the Air Force is planning a bioventing pilot test to determine if existing bacteria in the unsaturated zone could be activated to degrade EDB. He also mentioned that the unsaturated zone is dehydrated and could benefit from hydration during bioventing. Mr. McQuillan showed board members figures of soil vapor concentrations for volatile organic compounds at the site from June 2011 and September 2014 to highlight the decreasing concentrations over time.

Mr. McQuillan discussed the groundwater extraction and treatment system with the board and said that the system is likely collapsing the EDB plume. He said that the Air Force is working on a model to analyze the capture zones created by the groundwater extraction system and they are planning to present and discuss the results at a public meeting in November. Mr. McQuillan showed the board maps of the 2015 and 2018 EDB plumes and

said that it could be the extraction system or the rising water table that is causing the EDB plume footprint to collapse. He said that most of the groundwater monitoring wells have submerged screens and the Air Force recently completed installation of six additional monitoring wells to fill data gaps in monitoring. Mr. McQuillan said that groundwater monitoring wells at the distal end of the EDB plume have not yet been submerged but NMED is concerned about the west and south plume boundaries with respect to the rising water table.

Mr. McQuillan told board members about the public outreach that NMED and the Air Force have planned for the BFF project. He said that NMED will be engaging middle, high school, and college students by encouraging projects and presentations from these students. He said that there will be performances and presentations from students at the upcoming public meeting in November. Mr. McQuillan told board members that he is developing the public involvement plan for the BFF project for NMED and mentioned that the plan will be available for public comment when it is finished.

Ms. Kate Lynnes, Senior Advisor with the Air Force, told board members about the most recent drilling operations for the BFF project to install six additional groundwater monitoring wells. She said that the groundwater monitoring well installed near the Veteran's Affairs Hospital was non-detect for fuel contaminants and data for the other wells is currently being validated and will be available soon. Ms. Lynnes said the Air Force started drilling to collect eight soil cores to determine the extent of the remaining LNAPL in the source area. She added that seven of the eight soil core holes will be completed as groundwater monitoring wells and two of those seven will also have soil vapor monitoring wells. Ms. Lynnes said that there are over 150 monitoring wells in the network.

Ms. Lynnes told board members about the bioventing pilot test the Air Force has planned and explained that it was the next logical step to follow the soil vapor extraction (SVE) operations that previously occurred at the site. She said the intent of the bioventing pilot test is to deliver oxygen and moisture to the naturally occurring bacteria to enhance their ability to biodegrade the fuel. Mr. Pietz asked if the Air Force has done any rebound testing after shutting off the SVE system and added that he often sees sites turn off the SVE system too soon. Ms. Lynnes replied that they are not seeing significant rebounding of contaminant concentrations in the distal areas including Bullhead Park. Mr. Pietz suggested that the Air Force consider long-term pulsing of the SVE system in the source area.

Ms. Lynnes told board members about the ongoing in-situ biodegradation pilot test and said that the geologic material is permeable in the test area and they have good circulation to support the bio-stimulation phase of the pilot test. She said that the preliminary results indicate that the bio-stimulation phase is successfully stimulating the naturally-occurring bacteria to biodegrade the EDB and the Air Force has proposed to postpone the bioaugmentation phase because of the success of the bio-stimulation phase. Mr. Penttila asked what the Air Force used as a tracer for the pilot test and Ms. Lynnes replied that they used fluorescein. Mr. Penttila asked about the fate of the fluorescein and Ms. Lynnes said that it does not degrade and it is pumped out via extraction wells. Ms. Lynnes showed the board a graph of preliminary results from the pilot test and said that the Air Force is observing EDB concentrations decreasing by orders of magnitude in some wells. She said that the Air Force has not observed decreasing concentrations of other site contaminants

and expected that result because the pilot test was designed for the degradation of EDB only. Ms. Lynnes indicated that the Air Force may consider expanding the in-situ biodegradation system based on the results of the pilot test. Chair Howe asked Ms. Lynnes to further explain the locations of extraction and injection for the in-situ biodegradation pilot test and Ms. Lynnes asked Ms. Agnew, who has greater familiarity with the system, to explain it. Ms. Agnew pointed out the locations of the wells on a diagram for the board.

Ms. Lynnes showed the board the activity timeline for the BFF project and highlighted the next steps for the site. Ms. Lynnes said that all data collected to this point and all pilot test results will be further evaluated by the Corrective Measures Evaluation (CME) process the Air Force is anticipating to start in 2020. She said that the Air Force is currently doing research and studies to get the information needed to make an informed decision to select the final remedies for the site. Ms. Lynnes told the board that the Air Force just submitted a Phase I RCRA Facility Investigation (RFI) report to NMED in August which covered activities up to 2015 at the site. She added that a Phase II RFI report is in the works and will include data and information from 2015 to 2019.

Ms. Lynnes reviewed the activities planned at the BFF project from 2018 to 2020 for the board. She said the Air Force's contractor has completed a six-step capture zone analysis of the EDB plume using FEFLOW modeling software and told the board that the Air Force will run the model twice a year using the previous quarter's monitoring results to continue analyzing capture by the groundwater extraction system. Ms. Lynnes told board members that the injection well, KAFB-7, used to inject the treated groundwater, has been down since March and that repairs should be complete by November. Ms. Lynnes said the Air Force recently submitted a National Pollution Discharge Elimination System (NPDES) permit to the U.S. Environmental Protection Agency in September which would allow for discharge of the treated groundwater from the site into the Tijeras Arroyo. Ms. Lynnes told board members the Air Force plans to install a second injection well in the same area as KAFB-7 in accordance with their discharge permit. Mr. Pietz asked if the Air Force has any bio-fouling issues in KAFB-7 and Ms. Lynnes said that they have observed some bio-fouling at around 900 feet below ground surface in the injection well, but they did not see bio-fouling anywhere else. Ms. Lynnes said the Air Force is considering rehabilitating KAFB-7 and will do so either after they receive the NPDES permit or have the second injection well installed at the site so they have an option for disposing of the treated groundwater.

Ms. Lynnes invited the board to see the groundwater treatment system installed for the BFF project. She also reminded board members that NMED and the Air Force are hosting a geology field trip on October 20th as Mr. McQuillan had mentioned earlier in the presentation. Ms. Lynnes said that the next public meeting about the site will be on November 15th from 6:00 to 8:00 p.m. at the African American Performing Arts Center and will include a modeling deep-dive presentation from 5:00 to 6:00 p.m. for those who register.

VII. Other Board Business

Mr. McGregor suggested that the Policy Implementation Committee (PIC) should meet with MRCOG board members to strategize how to move forward with the oil and gas ordinance template development by the MRCOG Water Resources Board.

VIII. Public Comment Period

No one signed up for public comment.

IX. Adjourn

Chair Howe asked for a motion to adjourn. Dr. Thacher motioned to adjourn the meeting and Ms. Julia Maccini seconded the motion. Motion to adjourn the meeting passes unanimously. The meeting was adjourned at 10:16 a.m.