

APPENDIX R

**RESPONSIVENESS SUMMARY, DRAFT REMEDIAL INVESTIGATION REPORT
BROADWAY-PANTANO WQARF SITE, LANDFILL OPERABLE UNIT**

RESPONSIVENESS SUMMARY

**FINAL REMEDIAL INVESTIGATION REPORT--
LANDFILL OPERABLE UNIT
BROADWAY-PANTANO
WATER QUALITY ASSURANCE REVOLVING FUND SITE
TUCSON, ARIZONA**



**ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY
400 West Congress, Suite 433
Tucson, Arizona 85701
Southern Regional Office**

February 27, 2015

TABLE OF CONTENTS

Acronyms and Abbreviations 1

Introduction..... 2

Comments from the Broadway-Pantano WQARF Site Community Advisory Board 3

Comments from the City of Tucson Environmental Services 6

Comments from Montgomery & Associates 7

Comments from the Office of the Pima County Attorney 11

Comments from Jordan Bischoff & Hiser, P.L.C. 29

Comments from Adler Murphy & McQuillen LLP 31

Comments from Golder Associates 35

Acronyms and Abbreviations

Below are acronyms and abbreviations used either by the Arizona Department of Environmental Quality or by public commenters in their comments reproduced in this responsiveness summary.

§	section
A.A.C.	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
ARS	Arizona Revised Statutes
A.R.S.	Arizona Revised Statutes
bls	below level surface
BNL	Broadway North Landfill
BSL	Broadway South Landfill
BSP	Broadway Star Plaza
CAB	Community Advisory Board
CCA	Clear Creek Associates
CFR	Code of Federal Regulations
COC	contaminant of concern
COT-ES	City of Tucson—Environmental Services
cm ³	centimeters per cubic meter
FS	Feasibility Study
GOU	groundwater operable unit
HGL	Hydrogeologic, Inc.
HRA	human health risk assessment
J&E	Johnson & Ettinger
LOU	Landfill Operable Unit
NAPL	non-aqueous phase liquid
PCE	Tetrachloroethene a.k.a. perchloroethene
PRP	potentially responsible party
RI	Remedial Investigation
RSL	Regional Screening Levels (from USEPA)
Site	Broadway-Pantano WQARF Site
SD1PC	Sanitary District #1 of Pima County
SRL	Soil Remediation Level
SVE/AI	soil vapor extraction/air injection
TCE	trichloroethene
TEP	Tucson Electric Power
USEPA	United States Environmental Protection Agency
VOC	volatile organic compounds
WQARF	Water Quality Assurance Revolving Fund

Introduction

The Arizona Department of Environmental Quality (ADEQ) is presenting this Responsiveness Summary for comments received from various parties on the ADEQ *Draft Remedial Investigation Report—Broadway-Pantano WQARF Site—Landfill Operable Unit—Tucson, Arizona—November 14, 2013* (Draft LOU RI Report). The Draft LOU RI Report was made available for public review and comment between November 29, 2013 and February 26, 2014. ADEQ received written comments from the following: (1) the Broadway-Pantano WQARF Site Community Advisory Board; (2) City of Tucson, Environmental Services; (3) Montgomery and Associates on behalf of City of Tucson, Environmental Services; (4) Office of the Pima County Attorney; (5) Jordan Bischoff & Hiser, P.L.C. on behalf of Tucson Electric Power Company; (6) Adler Murphy & McQuillen LLP on behalf of Tucson Airport Authority; (7) Golder Associates on behalf of Arizona Board of Regents [for the University of Arizona]; Pima County; Raytheon Company; Tomkins Industries, Incorporated; Tucson Airport Authority; and Tucson Electric Power Company. ADEQ has prepared this responsiveness summary for the comments received regarding the Draft LOU RI Report. No other comments were received in the period allotted.

The title of the final report is “Final Remedial Investigation Report, Broadway-Pantano WQARF Site, Landfill Operable Unit” (Final LOU RI Report).

Comments from the Broadway-Pantano WQARF Site Community Advisory Board

Comments regarding the Draft LOU RI Report and input regarding the LOU ROs were received in a letter from the Site CAB Co-Chairs Janet Marcus and Bill Petrouston to ADEQ, dated February 20, 2014. The comments (input) in the letter regarding the Draft LOU RI Report were comments 1-4 and 7. The following section includes the text of comments pertaining to Draft LOU RI Report in boldface italics, along with an ADEQ response to address each comment.

COMMENTS

1. Given the temporal variability of volatile organic compound concentrations (VOCs) in soil gas, evaluation of the shallow soil gas pathway (vapor intrusion) should not be based on just one sampling event (as was done for Broadway South Landfill). The United States Environmental Protection Agency (USEPA) indicates in section C-5 and C-6 of its Superfund Vapor Intrusion FAQs (February 2012) that temporal variability in vapor concentrations in subsurface soil gas needs to be assessed through multiple sampling events.

ADEQ Response: Evaluation of the shallow soil gas pathway will not be based on just one sampling event. An additional sampling event will be performed for the Broadway South Landfill (BSL) to evaluate the shallow soil gas pathway. If the soil gas concentrations from the new sampling data are higher than the March 2013 soil gas data, then risk evaluation will be performed. This work will be performed during the Feasibility Study (FS). The need for this additional sampling and evaluation has been indicated as a data gap in a revised “Summary, Data Gaps, and Conclusions” section in the Final LOU RI Report.

2. The Arizona Department of Environmental Quality's (ADEQ's) Human Health Risk Assessment, Broadway North Landfill (July 7, 2010) report should be attached to the Final LOU RI Report as an appendix.

ADEQ Response: The referenced report has been attached to the Final LOU RI Report as Appendix M.

3. It is unclear in the text and needs to be clarified whether ADEQ's shallow soil gas pathway evaluations followed the USEPA guidance process and modeled transport of the VOCs from the sampling event location to the building or whether, instead, ADEQ "placed" the measured VOC soil gas concentrations directly under the buildings. If the soil-gas concentrations were modeled to reach the buildings, the impact of methane (produced from the landfills) should be included in these calculations since it can increase transport of hazardous substances via advection.

ADEQ Response: In the shallow soil gas pathway risk assessments for both the Broadway North Landfill (BNL) and BSL, the measured soil gas concentrations were “placed” directly under the buildings. The Final LOU RI Report (in the second paragraph in Section 7.1)

states the following with regards to the BNL shallow soil gas risk evaluation for the residences adjacent to the BNL:

The J&E Model was used to estimate indoor air concentrations at the exposure points of interest, making the conservative assumption that the soil gas probes were next to the foundations of adjacent residences with concrete slab on grade.

The Final LOU RI Report (in the paragraph 6 of Section 7.2) states the following with regards to the BSL shallow soil gas risk evaluation for occupants in buildings adjacent to the BSL:

For the outdoor exposure scenarios, the maximum soil gas concentration for each COPC in the exposure area was used to characterize cumulative risk; therefore only the highest incremental lifetime cancer risk (ILCR) and non-cancer hazard index (HI) are reported for each outdoor exposure area. For the indoor exposure scenarios, ILCR and HI were calculated using the J&E model for each individual soil gas sample location within the exposure area, based on the default assumption that a building could be present over any soil gas sample location.

The following text has been inserted at the end of the text above for clarification:

This means that the modeler conservatively assumed that the measured soil gas concentration would not be reduced by dispersion, biodegradation or adsorption if the soil gas were to migrate through the soil towards the building.

4. It is unclear to this Advisory Board whether present Governmental land use regulations for short- or long-term planning impact ADEQ access to the landfill properties for remediation purposes on Broadway North and South Landfills. Legal agreements (e.g., Prospective Purchaser Agreements, Partial Settlements, Declarations of Environmental Use Restriction) which ADEQ has with the owners of the landfill parcels MUST provide ADEQ with continuing access to protect the public safety and the City of Tucson's safe water supply.

ADEQ Response: ADEQ already has obtained easements through provisions in the Prospective Purchaser Agreements for most of the BNL parcels and in a settlement agreement pertaining to five BSL parcels.

ADEQ has easements that provide continuing access to all but two of the BNL parcels to conduct remedial, response, and corrective actions. ADEQ does not have easements to BNL parcels 133-23-098B and 133-23-0970 owned by Tucson Electric Power/Unisource Energy Corp (see Figure A2 in Appendix A of the Final LOU RI Report); however, ADEQ has negotiated access agreements with this property owner in the past as needed and will do so in the future.

ADEQ has easements that provide ADEQ continuing access to the following five BSL parcels: 134-27-0040, 134-27-0050, 134-27-0060, 134-27-0070, and 134-27-090 (see Figure A3 in Appendix A of the Final LOU RI Report). ADEQ does not have easements to the northernmost BSL parcels 134-27-0020, 134-27-0030, and 134-27-0010 or the southernmost parcel 134-14-010A (Gollob Park), but will negotiate access as needed to implement the final remedy. (Arizona Revised Statutes § 49-288 provides ADEQ with the authority to obtain access as needed for remediation of hazardous or regulated substances at the site.)

7. The Draft LOU RI Report indicates that groundwater and soil gas concentrations are increasing at the BSL but doesn't provide specifics in the text to support this statement. Also, the Draft LOU RI Report should include time series graphs that show the tetrachloroethene (PCE) data for both groundwater and soil gas (on the same graph) for each of the groundwater/soil gas well pairs because the RI states that PCE is increasing in both BSL groundwater and soil gas at some locations.

ADEQ Response:

The text in the Final RI Report and Appendix E has been revised to indicate that the concentrations are higher in 2013 than 2006. Also, as indicated in the revised “Summary, Data Gaps, and Conclusions” section of the Final LOU RI Report, ADEQ recognizes that additional sampling of these probes is needed.

Time series graphs showing the PCE data for both groundwater and soil gas (on the same graph) for each of the groundwater soil gas well pairs have been included as Appendix N in the Final LOU RI Report. However, the spatially limited monitoring network combined with the complex nature and large extent of the potential source area limit the usefulness of direct comparisons at any individual location.

Comments from the City of Tucson Environmental Services

Comments regarding the Draft LOU RI Report were received in a letter from the City of Tucson Environmental Services to ADEQ, dated February 26, 2014. The following section includes the text of comments in boldface italics, along with the ADEQ response to address each comment.

COMMENTS

The COT-ES requests that ADEQ check total depth on all soil vapor probes, especially those installed through refuse. Over the years COT-ES has observed settling compromising the integrity of either the well and/or the nested vapor probes.

ADEQ Response: ADEQ's contractor Clear Creek Associates (CCA) measured the total depth (using a slender metal tape) for each of the deep soil gas probes at the BNL and BSL on April 22-23, 2014. Results are as follows:

- Soil gas monitor wells DP-2 and DP-3 would not allow the steel tape measure to extend beyond 6' and 20', respectively.
- Soil gas monitor well probes DP-1-150' and DP-1-193' were found to have had the labels switched. The DP-1-193'-labeled probe was actually 153.95' deep and the DP-1-150'-labeled probe was actually 191.45'
- Excluding the gauging data from damaged DP-2 and DP-3 soil gas probes, the average deviation of the measured depth from the "nominal" depth for the wells was approximately $\pm 2'$, with the average positive deviation being 2.31' (with 35 well probes having a depth deeper than "nominal" depth) and the average negative deviation being -1.34' (with 17 well probes having a depth shallower than "nominal" depth). These deviations are indicated in the Final LOU RI Report.

The LOU RI Report and Appendix E have been revised, based on this information.

The COT-ES recommends additional characterization work should be completed at BSL near BP-23 to improve understanding of the local source conditions in this area and to support evaluation of the need for remedial actions to control PCE migrating from BSL.

ADEQ Response: ADEQ plans to resample the deep soil gas probes at BSL as part of the FS

The COT-ES recommends the dross area should be covered by a more permanent cover such as asphalt or concrete, and that the remaining landfill cap maintenance program should monitor and remedy settlements and sink holes.

ADEQ Response: ADEQ will evaluate the placement of an engineered cover as part of the FS.

Comments from Montgomery & Associates

Comments regarding the Draft LOU RI Report were received in a letter from Montgomery & Associates to ADEQ, dated February 26, 2014. Montgomery & Associates' review was conducted on behalf of Engineering and Environmental Consultants, Inc. on behalf of the City of Tucson, Environmental Services Department. The following section includes the text of comments in boldface italics, along with the ADEQ response to address each comment.

GENERAL COMMENTS

Pursuant to your request, Montgomery & Associates has reviewed the Draft Remedial Investigation (RI) Report for the Broadway-Pantano (BP) Water Quality Assurance Revolving Fund Site (WQARF) Landfill Operable Unit (LOU), dated November 15, 2013. The report was prepared by Clear Creek Associates, P.L.C. for the Arizona Department of Environmental Quality (ADEQ). The review was conducted on behalf of Engineering and Environmental Consultants, Inc. for the City of Tucson, Environmental Services Department (COT-ES).

With the exception of groundwater quality data for the Prudence Landfill provided by COT-ES, the review was relatively brief and focused solely on the information presented in the BP LOU RI report. A more thorough review could be conducted if needed and more time was available.

The BP WQARF site is divided into two operable units, the LOU and the groundwater operable unit (GOU). The BP WQARF Site includes the Broadway North Landfill (BNL) and the Broadway South Landfill (BSL). The final GOU RI report for the BP WQARF Site was prepared by Stantec on behalf of ADEQ in June 2012. The BP WQARF Site has been under investigation since the 1980s. The LOU RI report incorporates and/or references a substantial amount of information that was generated during many investigations conducted over the decades-long investigation at the BP WQARF Site. Of particular importance in the body of reference material is the GOU RI report. M&A did not independently review the GOU RI report or other reference material cited in the LOU RI report.

Based on the information presented in the LOU RI report, it appears that generally accepted industry standard methods were used during the LOU RI. In addition, the conclusions reached based on the data generated throughout the RI appear to be broadly reasonable.

ADEQ Response: No response needed.

SPECIFIC COMMENTS

Volatile Organic Compound (VOC) Sources to Soil Gas and Groundwater – ADEQ concluded that wastes containing VOCs were disposed of in the BNL and BSL, and that these wastes are or were the sources of VOCs detected in soil gas and groundwater within the BP WQARF site. ADEQ also concluded that the Prudence Landfill, located adjacent to and south of the BSL [sic] was not a source of VOCs to groundwater based on groundwater quality data from

monitor wells within and downgradient of the closed Prudence Landfill. M&A reviewed these groundwater quality data and agrees with this conclusion.

ADEQ Response: No response needed.

VOC Fate and Transport in Vadose Zone – ADEQ concluded that volatilization, vapor advection, vapor diffusion, sorption, biodegradation, and dissolution from soil gas to groundwater were the primary mechanisms for VOC migration from the landfill waste, through the vadose zone, to groundwater. This “vapor transport” source model is commonly agreed upon for landfills in arid environments. Evidence of advective VOC transport in infiltrating soil water and the presence of non-aqueous phase liquids (NAPLs) was not identified, but their occurrence cannot be eliminated. M&A agrees with the conclusions reached regarding the source model and fate and transport of VOCs at the BNL and BSL.

ADEQ Response: No response needed.

Vadose Zone Remediation at BNL – Soil vapor (synonymous with soil gas) extraction (SVE) with air injection (AI) was conducted at the BNL from 2000 to 2002. The SVE/AI system was considered largely successful at mitigating the BNL vapor source because VOC concentration in soil gas have remained low and VOC concentrations in groundwater decreased in most BNL monitor wells after cessation of the SVE/AI.

M&A concurs that the soil gas and groundwater quality data indicate that the SVE/AI program was successful at minimizing the migration of VOCs from the waste material to groundwater beneath the BNL. However, understanding of the waste disposition in the BNL is incomplete and an active source could resume in the future. Therefore, groundwater sampling should continue at the BNL to confirm the long-term success of the SVE/AI program. If VOC concentrations in groundwater increase in the future, additional soil and/or soil gas sampling (at existing and potentially new soil gas monitor wells) may be required to further characterize source conditions.

ADEQ Response: Groundwater monitoring and sampling will continue at the BNL to confirm the long-term success of the SVE/AI system.

Conceptual Site Model of VOC Sources at BNL and BSL – a conceptual site model (CSM) for the nature and status of VOC sources at the BNL and BSL was proposed by ADEQ. The CSM includes two potential VOC source conditions: 1) a “post-SVE/AI phase” and 2) an “active release phase.” ADEQ considers the BNL to be in “post-SVE/AI phase”, where the majority of source mass has been removed and ongoing vapor diffusion is offset by biodegradation. In contrast, the BSL is in “active release phase”. M&A generally agrees with this characterization of the BNL and BSL sources. Given the success of SVE/AI at BNL, M&A recommends that a similar remediation program be considered for the BSL, where data indicate that VOC concentrations in soil gas and groundwater are increasing.

ADEQ Response: ADEQ will evaluate remedial measures, including SVE, for the BSL as part of the FS.

WR-274A Groundwater Quality Trends – soil vapor/groundwater monitor well WR-274A is located immediately west of the central portion of the BNL. The well is located downgradient of the area where the highest tetrachloroethene (PCE) concentrations were detected historically at the BNL (at monitor well R-068A). PCE concentration and groundwater elevation have increased in WR-274A since 2002, as shown on Figure 30. ADEQ postulates that the increasing PCE concentration could be the result of mobilization of sorbed PCE by groundwater as it becomes submerged beneath the water table. M&A agrees that this could be occurring; however, conclusive data do not exist to confirm its occurrence. Further, ADEQ reports that PCE concentrations in deep soil gas near WR-274A are orders of magnitude lower than would be expected based on the observed PCE groundwater concentrations in the well and estimated VOC mass transfer via Henry’s Law.

Given the observed conditions at WR-274A, other processes may be contributing to the increasing PCE concentration in the well, including: 1) migration of higher concentration PCE-impacted groundwater from upgradient (e.g., from the area of historically highest concentration) and/or 2) a local source of PCE in the vadose zone near WR-274A (as ADEQ suggests in Section 6.2.2). Given the uncertainty about the cause of the increasing PCE concentration at WR-274A, M&A recommends that additional focused characterization work be completed near WR-274A to improve understanding of local source conditions and to support evaluation of the need for remedial actions to control PCE migration from the BNL.

ADEQ Response: Groundwater monitoring and sampling will continue at the BNL to confirm the long-term success of the SVE/AI system; however, based on the existing BNL groundwater and soil gas data, focused investigation near WR-274A is not warranted at this time. ADEQ will re-evaluate should site conditions change. ADEQ plans to sample WR-274A (and other key wells) in FY2015 as part of the FS.

Data Sufficiency and Use for Risk Assessment – two human health risk assessments (HRAs) were conducted for the BP WQARF Site. The first HRA was conducted by Stantec in 2010 to evaluate risks to residents from exposure to VOCs in indoor air near the western and southwestern perimeter of the BNL. The Stantec HRA used soil gas data collected in 2002 and 2006. The second HRA was conducted by Copeland & Associates in 2013 to evaluate risks associated with VOCs detected in soil gas at the BNL (onsite risk only), BSL, and four developed areas within or adjacent to the BSL (Appendix L of LOU RI report). The Copeland & Associates HRA used only soil gas data collected in 2013. M&A recommends that risks associated with exposure to VOCs be assessed at the Broadway Star Plaza, located on the south side of the BNL in an area of historical landfill and dross disposal.

ADEQ Response: The Broadway Star Plaza (BSP) is located on top of the southern half of the dross (mixed metal waste-soil)/construction debris site and also approximately 400 feet away from the southeastern tip of the municipal mixed-waste BNL. In the latter 1990s, for a planned development, Home Depot performed extensive trenching and testing in the parcel located

immediately to the north of the BSP. The data documented in *Final Solid Waste Closure Plan—Proposed Home Depot Development Project*, dated March 11, 1998, prepared by McLaren Hart, Inc. for Home Depot (Table 2) indicate that landfill and soil samples collected at six lateral locations [at depths ranging from 3' below level surface (bls) to 15.5' bls] contained no volatile organic compounds, with the exception of one sample which contained 48 parts per billion of acetone. Home Depot performed additional trenching and dross testing—mainly for metals which were the Contaminants of Concern (COCs) for the dross—but four of the collected samples were also tested for VOCs. The four samples were non-detect for VOCs, with the exception of one sample which contained trichloroethene (TCE) at a concentration of 0.180 milligrams per kilogram; this concentration is an order of magnitude lower than the Arizona Residential Soil Remediation Level (SRL) of 3.0 milligrams per kilogram and two orders of magnitude lower than the Non-Residential SRL of 65 milligrams per kilogram (*Risk Evaluation of Remedial Alternatives—Broadway Store Relocation, Broadway Boulevard & Prudence Road, Tucson, Arizona*, dated December 11, 2000, prepared by Aplomado Environmental LLC for Home Depot USA, Inc.). Given the preceding site conditions, shallow soil gas health risk evaluation was not warranted for the BSP shopping center.

Landfill Cover – limited information is presented in the LOU RI report about the current disposition and maintenance program of the landfill cover material. Burrowing animals have apparently brought dross to the surface in the dross disposal area. The cover material should be maintained to minimize infiltration of water through the cover and minimize potential exposure to waste material. Placement of engineered covers should be evaluated in the feasibility study.

ADEQ Response: ADEQ will evaluate the placement of an engineered cover as part of the FS.

Comments from the Office of the Pima County Attorney

Comments regarding the Draft LOU RI Report were received in a letter from the Office of the Pima County Attorney (PC) to ADEQ, dated February 26, 2014. The following section includes the text of comments in boldface italics, along with the ADEQ response to address each comment.

COMMENTS

GENERAL COMMENTS

To summarize, ADEQ is charged by law with 1) adequately identifying and evaluating all potential sources of contamination, 2) characterizing the extent of the contamination; 3) identifying rational contaminant transport scenarios, and 4) developing a sufficiently coherent dataset such that the State can develop an economically reasonable feasibility study.

It is Pima County's conclusion that the draft RI:

- a) Has ignored or dismissed potential sources that would be critical to an understanding of the overall situation,*
- b) Has created inconsistent plume maps that suggest that we do not have a clear understanding [sic] what the extent of the contamination is,*
- c) Has decided to merge the BNL and BSL without objective data indicating that the two actually have merged and has not performed the required E & E,*
- d) Is devoid of historical evidence that is both credible and admissible,*
- e) Has failed to adequately define the contamination 'problem' such that defining a 'solution' (through the Feasibility Investigation process) is doomed to fail, and*
- f) Is inconsistent with the National Contingency Plan.*

ADEQ Response: Comments a, b, d, e, and f do not provide sufficient detailed information or rationale to allow for a response. ADEQ administratively “merged the BNL and BSL” based on two hydrogeologic realities: (1) the BNL and BSL PCE plumes have commingled in the past (2005, 2006) and (2) the dominant ambient groundwater flow directions of westward from BNL and northwestward from BSL, will continue to cause these two plumes to commingle, given sufficient mass of PCE released from each landfill.

SPECIFIC COMMENTS

Pima County has confined the following comments to issues pertaining to the BSL. Pima County's responsibilities in connection with the BNL were resolved some years ago pursuant to that settlement agreement and consent decree attached hereto as Exhibit “A”. Pima County wishes ADEQ to take into account the following comments:

1.0 With a record in the hundreds of thousands of pages, it is apparent that a substantial amount of work has been done at this site, sporadic as it may have been. The scant amount of time that ADEQ has allowed the public to respond to the LOU RI is clearly insufficient. Notwithstanding the sheer volume of ADEQ reports, exhibits, figures and appendices, it is apparent that the draft LOU RI satisfies neither the applicable statutory criteria nor the federal guidance.

ADEQ Response: The presumption that ADEQ did not satisfy the applicable statutory criteria for public comment is incorrect. Pursuant to A.A.C. R18-16-301(C), for documents requiring public comment periods for which ADEQ law or rules do not specify the duration of the public comment period, ADEQ is required to provide a minimum of 30 days for public comment. For this Draft LOU RI Report, ADEQ initially provided 60 days for public comment and then increased the public comment period to 90 days. It should be noted that even though the public comment period began on November 29, 2013, Pima County did not submit most of its document requests to assist Pima County in its review of the Draft LOU RI Report until early February 2014. Moreover, as Pima County indirectly acknowledges, work at these sites has been ongoing for many years. For this reason, the issuance of the Draft LOU RI should come as no surprise to any party. Ample time to request and review supporting documents by interested parties was available over the years.

2.0 The LOU RI contains references to work undertaken since 2007 in connection with the finalization of the Remedial Investigation for the Groundwater Operable Unit ("GOU"), a draft of which was published on April 2, 2007. These subsequent additions to the GOU RI never received public review. Five years elapsed before the GOU RI was finalized. Throughout that entire period ADEQ failed to provide any public opportunity to comment on the multitudinous updates and changes that were made. Pima County and any other member of the public are entitled to comment on the extensively supplemented GOU RI, given that the draft LOU RI relies so heavily on it. A ruling to the contrary would violate both ADEQ's responsibilities under the WQARF program, and elementary administrative procedure. We further expect that ADEQ will review and comment upon such comments just as it did for the initial proceedings of the draft GOU RI.

Nevertheless, Pima County objects to the substantive expansion of the GOU RI by ADEQ without providing affected parties with an additional opportunity to comment.

ADEQ Response: The Draft Groundwater Operable Unit (GOU) RI Report public comment period was 56 days. ADEQ received comments on this report from four parties, including Pima County with 10 pages of comments, which ADEQ responded to.

Work has been ongoing at this site has been ongoing for many years. Ample time to request and review supporting documents by interested parties was available over the years.

3.0 State law sets the standards for Remedial Investigations to ensure that the product results in a feasibility study, record of decision, and ultimately, a site clean-up that is protective of human health and the environment – all the while meeting the economic

reasonableness and technical feasibility directives of the WQARF program. Due to the intermittent and unfocussed [sic] data collection upon which the RI is based, these goals are not achievable.

The LOU RI fails to provide sufficient information necessary for identification and comparison of remedial alternatives. Alarming, these documents even fail to evaluate the landfill gas extraction system at the Broadway South Landfill that has been in place for decades. The LOU RI also fails to review the surface and landfill cap conditions above the BNL and the BSL; consequently it is inconsistent with the National Contingency Plan.

Another example is the inability of Clear Creek to identify the quantities of chemicals of concern. 40 CFR 300.430 (d) (2) (iii) requires that the Department characterize the wastes, including their "...quantities, state, concentration, toxicity, propensity to bioaccumulate, persistence, and mobility." 40 CFR 300.420 (d) (1) clarifies that "The purpose of the remedial investigation (RI) is to collect data necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives." The ability of the Department to choose an appropriate remedial action is questionable if the waste cannot be identified.

ADEQ Response: The existing methane mitigation and monitoring systems at the BNL and BSL are regulated and reviewed by the City of Tucson Fire Prevention and City of Tucson Environmental Services Departments, respectively, not ADEQ. Methane is not regulated under WQARF. However, ADEQ does realize that the methane mitigation system is likely removing non-methane contaminants and, thus, if either system were shut down, a shallow soil gas evaluation would need to be performed after shutdown. Given that the methane mitigation system is located at the landfill boundaries and at shallow depths, its impact on vapor transport of contaminants down to groundwater is likely negligible. ADEQ does not see such modeling as providing information that would prove useful for performing the FS.

The United States Environmental Protection Agency's (USEPA's) National Oil and Hazardous Substances Pollution Contingency Plan establishes Federal response to oil spills and hazardous substance releases and is a framework for hazardous waste sites requiring emergency removal actions. Pima County will need to clarify how the National Contingency Plan specifically relates to their comment regarding this site. (USEPA's summary of the National Contingency Plan can be found at – <http://www2.epa.gov/emergency-response/national-oil-and-hazardous-substances-pollution-contingency-plan-ncp-overview#Key>). For the remedial activities performed by ADEQ at Water Quality Assurance Revolving Fund Registry sites, the applicable and appropriate regulations are found under Arizona Administrative Codes (A.A.C.), Title 18, Chapter 16.

4.0 Among other standards, ADEQ must promulgate a Remedial Investigation that satisfies the requirements of ARS 49-287.03 directing ADEQ to "adequately characterize the site ... for the purpose of developing and evaluating effective remediation alternatives." ADEQ appears to have decided that it need not make such a characterization, which is

simply inconsistent with the statutes. Frankly, such a decision suggests that the Department has concluded that the site does not present a significant risk to the public health or welfare. That is a reasonable conclusion. Consequently, A.R.S. 49-287.01(G) requires that the site be delisted. That would be a rational course of action, at least for the BSL.

ADEQ Response: The main concerns at the Site have been (and are) the releases of volatile COCs from the landfill wastes to groundwater and potential exposures to those COCs in drinking water and potential exposures to COCs in air via vapor transport. These pathways have been substantially investigated during the remedial investigation process. Additional investigation will also be performed during the FS for Broadway South Landfill regarding potential shallow soil migration towards adjacent structures. ADEQ believes that the requirements pursuant to A.A.C. R18-16-406 have been met.

Also, A.R.S. 49-287.01(G) does not require that the site be delisted, but provides for a No Further Action (NFA) determination under specific conditions.

5.0 We cannot help but observe that the draft LOU RI contains few conclusions and innumerable hypotheses. Logically, it must be said that if the State had undertaken sufficient research to identify what pollutants are to be found at this WQARF site, those would have been identified in the draft RI.

ADEQ Response: ADEQ refers Pima County to Sections 4.1, “Contaminants of Concern,” and 8.0, “Summary, Data Gaps, and Conclusions,” in the Final LOU RI Report (and also the Draft LOU RI Report).

6.0 There is a history of litigation pertaining to the alleged origins of chemicals of concern at the Broadway South Landfill ("BSL"). The original owner of the hotel site brought a lawsuit against Pima County twenty years ago. Of course, the plaintiff in that case was able to rely upon witnesses and testimony that were closer in time to the pertinent events, and therefore more reliable. The consequences of that litigation can be found in the opinion attached at Exhibit "B", Broadway Prudence Hotel Associates v. Pima County, 2 CA-CV 93-0146. Simply put, the court upheld a directed verdict in favor of Pima County, holding that evidence of Pima County's disposal of hazardous substances at the BSL was lacking.

ADEQ Response: Comments addressing the potentially responsible party (PRP) investigation and potential liability of PRPs are inappropriate at this stage of the Remedial Investigation and will not be addressed.

7.0 HGL undertook a site history for the WQARF site, which appears to rely upon, and include mistakes from, an earlier site history that had been undertaken for the City of Tucson eight years before by the consulting firm URS. It refers to many interview summaries, which are hearsay, rather than first-hand testimony.

7.1 On page three (of 17) the HGL Report bases some of its history of fifty- year old operational details at the Broadway South Landfill on summaries of Eugene "Bud" Dooley's interviews with Mr. Lynn Bedford. Not only is Mr. Dooley being quoted as to matters that occurred years before he was hired by Sanitary District No.1, Mr. Dooley himself has refuted the summaries, which were never shown to Mr. Dooley. See the affidavit of Eugene Dooley, attached as Exhibit "C".

ADEQ Response: Comments addressing the credibility and reliability of witness testimony are not appropriate at this stage of the RI and will not be addressed.

7.2 At Page 5 (of 17), the HGL Report identifies parcels that it asserts were operated by Pima County, identifying all or portions of nine different parcels that were supposed to have been under Pima County's control. Attached at Exhibit "D", is an exhibit prepared by Pima County that identifies the sole ten-acre parcel that it leased prior to it being supplanted by the Sanitary District. The 10-acre parcel that Pima County leased from the Gollobs from 1953-1956 has never been shown to be the source of chemicals of concern. Sanitary District No. 1 began operations at the site in 1956, and since that time Pima County has had no further connection with the Broadway South Landfill. The Hilton Hotel referred to on Page 6 (of 17) of the HGL Report overlies a significant portion of the ten acre parcel that was occupied briefly by Pima County more than sixty years ago. The hotel and the accompanying parking lot constitute an impermeable barrier over a large portion of that comer of the former BSL that was briefly leased by Pima County.

ADEQ Response: Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed. To the extent this comment addresses technical issues, ADEQ will respond. As summarized in the referenced HydroGeoLogic, Inc. (HGL), report, Pima County entered into agreements with Sanitary District #1 of Pima County (SD1PC) concerning the BSL. Meeting minutes recorded by SD1PC indicate that, beginning in 1957, the Pima County Board of Supervisors agreed that Pima County would rent an undivided interest in SD1PC-operated landfill sites. A June 30, 1958, agreement between Pima County and SD1PC indicates that Pima County had an undivided interest in the "sanitary fill site now operated by the district on east Broadway near the Pantano Wash in Pima County, Arizona." The agreement also states that Pima County would have an undivided interest in all sanitary fill sites acquired by SD1PC during the term of the agreement. The agreement gave residents and haulers residing or doing business outside the limits of the City of Tucson and SD1PC the right to deposit waste at landfills operated by SD1PC. The term of the agreement was from July 1, 1958, to June 30, 1959. Meeting minute records indicate that Pima County and SD1PC had entered into a similar agreement for the period from December 1, 1957, to June 30, 1958.

7.3 Section 1.4.1 of the LOU RI makes the assertion that Pima County and Sanitary District No. 1 shared an "undivided interest" in the BSL from 1956 until the landfill closed in 1962. However, from and after 1956, Pima County had no interest at all in the BSL other than the contractual relationship with the operator, Sanitary District No.1, a separate unit of local government. The Report fails to note that state law, at that time, required Counties to provide their citizens with a place to dispose of solid waste. Pima County could have maintained that responsibility but decided instead to contract with Sanitary District No. 1 which was solely engaged in solid waste disposal. Pima County preserved for its own citizens the ability to dispose of their waste in the landfills of Sanitary District No. 1, but neither disposed of its own wastes in such landfills, nor operated those landfills. Pima County never owned the landfill, either before or after 1956. And from that point forward, it had neither a lease nor an easement on that ten acre parcel or any other portion of the BSL. Consequently, it had no owner or operator 'interest' in the landfill, at all.

ADEQ Response: Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed. To the extent this comment addresses technical issues, ADEQ will respond. Section 1.4.1 of the LOU RI Report states that “[i]n 1958, Pima County and SD1PC agreed to share undivided interest in the landfill, which they did until the landfill closed in 1962.” According to agreements discussed in detail in ADEQ’s response to comment 7.2, and previously summarized in HGL’s report, Pima County and SD1PC agreed to share an undivided interest in the landfill in 1957 and 1958, and this agreement was renegotiated annually. Analysis of historical aerial photographs indicates that the BSL ceased operations in 1962.

7.4 Section 1.4 "Site History" of the LOU RI fails to note that the City of Tucson entered into agreements with Sanitary District No. 1 to dispose of waste at the BSL. Copies of relevant materials have previously been provided to ADEQ.

ADEQ Response: Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the Remedial Investigation and will not be addressed. To the extent this comment addresses technical issues, ADEQ will respond. As summarized in the HGL report, agreements that allowed the City of Tucson to dispose of waste in the SD1PC-operated portion of the BNL and BSL are documented from 1959 to 1963. These agreements indicate that, at a minimum, the City of Tucson used SD1PC-operated landfills during the years specified. (A footnote will be added in Section 1.4 of the LOU RI Report regarding these agreements.)

7.5 Table 5 at Page 12 of the HGL Report presents a list of industries and chemicals used.

7.5.1 Under 'aircraft repair' including military and defense contractors, and missile maintenance, a footnote claims some Air Force technical orders mandate the use of PCE and TCE for aircraft and missile cleaning during the time that BSLF and BNLF were operational. The referenced Air Force technical order is T.O. 42C-1-20 dated 15 May 1983, more than 12 years

after the BNL closed and more than 20 years after BSL closed. Clearly, this document does not cover the time period when the landfills were operational. Any technical standard relied upon must have been in effect at the time when the landfills were in use, not decades after closure.

ADEQ Response: Many technical orders and military specifications issued during the time that the BSL and BNL were operational permit the use of TCE and PCE, including, but not limited to: T.O. 2-1-111, which was issued December 15, 1970; T.O. 1F-100A, which was issued November 9, 1962; and Garret/AiResearch Publication Report No. 6A-860(2), which was published on March 1, 1967.

7.5.2 Similarly, under 'auto repair', a footnote claims that brake and carburetor cleaners may contain TCE and PCE. The cited reference includes a November 29, 1995 report that states that Southern Pacific was using aerosol brake cleaner and engine starter at the time of the report. Once again, evidence of use of these solvents is during a time period over two decades after both landfills were closed.

ADEQ Response: These sources, reports, and initiatives indicate that TCE and PCE, which were historically used for carburetor and brake cleaning, were not being phased out of use until 1995 or 2000, decades after the closure of the BSL and BNL. Additionally, these sources indicate that these contaminants were commonly used throughout the BSL and BNL operational periods. Sources noting the use of TCE and PCE in automotive repair are extensive and easy to find, but HGL's report does not contain an exhaustive list of these sources.

7.5.3 Another cited reference included a California air resource board plan in 2000 to phase out the use of PCE and TCE in brake and carburetor cleaners and general degreasers. Once again, the relevance to use and disposal in 2000 is irrelevant to use or disposal practices 30 to 50 years prior to this document.

ADEQ Response: These sources, reports, and initiatives indicate that TCE and PCE, which were historically used for carburetor and brake cleaning, were not being phased out of use until 1995 or 2000, decades after the closure of the BSL and BNL. Additionally, these sources indicate that these contaminants were commonly used throughout the BSL and BNL operational periods. Sources noting the use of TCE and PCE in automotive repair are extensive and easy to find, but HGL's report does not contain an exhaustive list of these sources.

The final reference is a July 1998 fact sheet from the Minnesota Pollution Control Agency suggesting that MN DOT employees try to pick the safest carburetor and brake cleaners. Although this document states that some aerosol brake cleaners contain PCE in 1998, there is nothing that pertains to use and disposal of PCE or TCE at the BNL during operation in the 1960s-1971 or disposal of PCE in the BSL from 1953-1962.

ADEQ Response: These sources, reports, and initiatives indicate that TCE and PCE, which were historically used for carburetor and brake cleaning, were not being phased out of use until 1995 or 2000, decades after the closure of the BSL and BNL. Additionally, these sources indicate that these contaminants were commonly used throughout the BSL and BNL operational periods. Sources noting the use of TCE and PCE in automotive repair are extensive and easy to find, but HGL's report does not contain an exhaustive list of these sources.

8.0 The BSL and the BNL were consolidated inappropriately to form the Broadway-Pantano Water Quality Assurance Revolving Fund ("WQARF") site.

8.1 Section 1.3 of the GOU RI makes this finding, on Page 3: "... the GOU consists of two distinct plumes, one emanating from the BNL and one emanating from the BSL ... " Pima County objects to the two landfills being "consolidated", and directs ADEQ to the holding in Mead Corp. v. Browner, 100F.3d 152 (1996). In that case, the EPA tried to aggregate a low risk site with a high risk site. The court ruled to the contrary: "The idea that Congress implicitly allowed EPA broad discretion to lump low-risk sites together with high-risk sites, and thereby to transform the one into the other, is anything but reasonable.... Permitting the inclusion of low-risk sites on the NPL would thwart rather than advance Congress's purpose of creating a priority list based on evidence of high risk levels."

8.2 Prior to listing any site as appropriate for treatment under WQARF, ADEQ must undertake an "eligibility and evaluation site scoring model under R18-16-202." ADEQ staff has acknowledged that no scoring of the Broadway South Landfill was ever undertaken.

ADEQ Response: The BSL has been identified as an additional source within the Broadway-Pantano WQARF Site. No "lumping" of sites has been performed. ADEQ administratively "merged the BNL and BSL" based on two hydrogeologic realities: (1) the BNL and BSL PCE plumes have commingled in the past (2005, 2006) and (2) the dominant ambient groundwater flow direction of westward from BNL and northwestward from BSL, will continue to cause these two plumes to commingle, given sufficient mass of PCE released from each landfill.

An eligibility and evaluation site scoring is not required to add another source area to an existing WQARF site. When the BSL plume was found to have commingled with the BNL plume in 2005, the BSL became part of the Broadway-Pantano WQARF Site as an identified separate source.

9.0 The draft RI peremptorily dismisses the potential contributions from upstream sources, including the Prudence Landfill ("PL"), which is immediately adjacent to and upgradient of the Site. Based upon Figure 11 in the draft RI, the PL is located directly upgradient of much of the Broadway-Pantano WQARF Site. The GOU RI report

(Stantec, 2012a) acknowledges that a PCE release at the PL has occurred. Routine monitoring at the landfill by City of Tucson Environmental Services (2012) has documented spikes in PCE concentration in deep landfill gas samples collected at well WR-434A, a well located at the extreme southern end of the BSL and very close to the west side of the Prudence Landfill. Some of the detected concentrations of PCE have been in excess of 20 micrograms per liter, values comparable to those detected in deep probes under the BNL in the 1990's (CDM, 1998). The draft RI indicates deep soil gas samples were recently collected from well WR-434A, but does not include a discussion of results, or a comparison with historic soil gas results, or present a discussion on the possible source of the elevated values.

We request that ADEQ elaborate on the possibility that the PL could be a source of COCs in down-gradient soil vapor and groundwater. The location of the PL should also be identified on appropriate figures within the report.

ADEQ Response: The Draft LOU RI Report, Section 1.3, states the following:

The closed Prudence Landfill, located to the east and south of BSL, is not considered to be a source based on groundwater quality data from monitoring wells within and downgradient of the Prudence Landfill boundary (Stantec, 2012b and HGL, 2012).

“Stantec, 2012b” referenced at the end of the text above, is the Final Remedial Investigation Report—Groundwater Operable Unit—Broadway-Pantano WQARF Site (dated June 1, 2012). The following explanation regarding Prudence Landfill is included in Section 3.1.4 of the GOU RI report:

It should be noted that groundwater data and figures for the Prudence Landfill (PL), located to the south of the BSL, were reviewed to evaluate whether the PCE release at PL could be contributing to the groundwater contaminant plume emanating from the BSL. COT has two groundwater monitor wells (R-124A and R-125A) located on the PL, and one groundwater monitor well (WR-435A) located immediately downgradient of the PL (Figure 2). PCE and all other groundwater COCs (for the Broadway-Pantano Site) levels in these three wells have been either non-detect or well below the AWQS since their installation (COT, 2012). Also, there are two BSL groundwater monitor wells (BP-11 and BP-22) located between these three PL wells and the BSL plume to the north, and PCE levels in monitoring wells BP-11 and BP-22 have rarely exceeded the AWQS. Therefore, the PCE release at the PL does not appear to be contributing to the BSL plume.

During ADEQ’s most recent groundwater sampling event in 2011, PCE was detected in the BP-22 well for the first time and the detection was above the Aquifer Water Quality Standard. The concentration was 8.4 micrograms per liter. ADEQ will be sampling well BP-22 (as part of its sampling of select wells) next fiscal year and will determine whether this well still contains

elevated PCE. If the well still contains elevated PCE concentrations, ADEQ will evaluate whether additional investigation is needed. (However, if additional investigation were undertaken, it would likely be focused on the BSL and not on Prudence Landfill.)

10.0 Both the LOU RI and the HGL report that it incorporates go to great lengths to avoid stating the obvious: nearly the entirety of their conclusions about historical operations are based upon the unsupported and unreliable statements of Mr. Joe Blankinship. Even though the LOU RI claims that the HGL Report "includes testimony provided by a solvent collector and recycler", the HGL Report does NOT include such testimony. Rather, both the HGL Report and the LOU RI make innumerable references to summaries (hearsay) of whatever it is that Mr. Blankinship might have said privately to an investigator working for ADEQ. If ADEQ is to rely upon the testimony of a convicted felon, it should at a minimum provide direct citations to its witness' testimony.

ADEQ Response: Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed.

Mr. Blankinship provided 27 days of testimony during sworn depositions. A total of 135 written summaries of interviews with Blankinship were submitted as exhibits in his depositions.

Although there are a quite a number of evidentiary issues surrounding Mr. Blankinship's testimony -- including, especially, his credibility -- eight broad categories of problems with

Blankinship's testimony and claims made in interviews cannot be ignored. These broad categories include:

A. Available evidence shows that Blankinship was not disposing of any waste at BSL, BNL or the sandpits that were later used for waste disposal at BSL and BNL. Blankinship's testimony clearly indicates the locations he believed to be BNL and BSL were, in fact, somewhere else.

B. Blankinship repeatedly testified that he disposed of waste at the closest free landfill. The BNL and BSL were not the closest landfills for most disposal activities Blankinship testified about.

C. The equipment Blankinship claims he used for solvent collection recovery and recycling either did not exist at the time of BSL and BNL operation or could not be used for the purposes he described.

D. Blankinship failed to identify PCE as a material that was collected, recycled or disposed of at the BNL or BSL. Furthermore, Blankinship's description of solvents he allegedly collected from dry cleaners could not have been PCE or TCE based on his descriptions of the physical characteristics of the solvent.

E. Blankinship claimed that samples of solvents were submitted to laboratories and that written reports were generated. As of this time, no written lab reports, other written reports or any other evidence has been provided showing what these so-called solvents actually contained. None of the laboratories Blankinship identified can find evidence of solvent analysis for Blankinship.

F. Blankinship testified about two associates who were his supposed experts in chemistry. No evidence to support such claims was provided. Available evidence shows that they were not experts in chemistry.

G. ADEQ failed to take sufficient efforts to authenticate the stories and testimony provided by Blankinship.

H. Blankinship, given immunity from prosecution in exchange for his testimony; had an extensive criminal history; and had been convicted of multiple felonies.

We will address each of these subject areas separately.

ADEQ Response: Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed.

10.1 Allegations of Disposal at BNL and BSL. Blankinship claimed that he disposed of waste in the BSL and BNL and in certain sand pits prior to their use for the BNL and BSL.

He repeatedly claimed that he disposed waste in the sandpits north of Broadway before the BNL was opened. Blankinship provided detailed information about the sites he believed were the BSL and BNL locations. This detailed information included:

10.1.1 Blankinship repeatedly testified that he disposed of waste in the sand and gravel pits operated by Allen and Kight (Glenn Allen and Darrell Kight) before the landfills opened. Blankinship testified that Allen and Kight made a deal with a rancher named Franco to put in the first sand pits on the north side on the Pantano. He testified that Allen and Kight's sand pits would later become the BNL.

10.1.2. Blankinship went on to testify that people were still using Allen and Kight's sand pits at the time of his deposition in 2009.

10.1.3. Blankinship also testified numerous times that when he went to the

Broadway dump areas, there was no bridge on Broadway over the Pantano wash.

10.1.4 Blankinship also testified numerous times that he disposed of waste in San Xavier Rock and Sand pits.

The clear weight of Blankinship's testimony points to disposal at 22nd street and the Pantano wash instead of Broadway and the Pantano.

The following evidence supports this conclusion:

10.1.5 Title searches by ADEQ investigators show the property that was used for the BNL and BSL was owned by the Gollob family. Summaries of interviews of Gollob family members make no mention of Glenn Allen, Darrell Kight or Franco. No recorded leases or deeds have been identified showing Allen, Kight or Franco on the BNL or BSL properties.

10.1.6 A deed recorded in April 1955 shows the property located on the north side of 22nd St. along the Pantano wash (located at 7707 E. 22nd St) was purchased by Glenn Allen and Darrell Kight. The property was later sold to Peter and Mike Damento in October 1959.

10.1.7 Telephone directories in the mid-1950s list "ACME Sand and Gravel, D.L. Kight, owner" located at 7707 E. 22nd St. Beginning with the 1960 telephone directory, the listing for ACME is the same except that Pete and Mike Damento are listed as owners. Subsequent telephone and city directories show the site to be occupied by ACME through the present time. A January 2011 site visit to 7707 E. 22nd St., found the property to be occupied by ACME with sand and gravel operations being conducted.

10.1.8 Public records show San Xavier had a sand and gravel operation at 7900 E. 22nd Street at the Pantano wash (located on the south side of 22nd Street). ADEQ should have this information in the 8/09/2012 HGL Summary of Tucson City Directories Search regarding San Xavier Rock & Sand identified in ADEQ's privilege log.

10.1.9 The Broadway Boulevard bridge over the Pantano wash is clearly visible in the 1953 aerial photographs used by ADEQ in the Blankinship deposition (see Blankinship deposition, Exhibit 39). Numerous photographs, records and reports show a bridge present on Broadway over the Pantano wash as far back as the 1940s. The bridge over the 22nd Street crossing was not started until fall 1963 and was completed in 1964 according to available records, reports and photographs.

ADEQ Response: Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed.

10.2. Closest Disposal Locations

Blankinship testified numerous times that he disposed of waste at the closest places that were free and didn't charge for disposal. To quote Blankinship "we got rid of waste as closely we could to where we was at [sic]. -+

We didn't want to haul it any further than we had to." (Blankinship deposition, page 91)

10.2.1 A spatial analysis of areas Blankinship claimed to have recycled solvents relative to open landfills was prepared by ADEQ and marked as Exhibit 2 of his deposition. With very few exceptions, the BNL and BSL were not the closest landfills to the areas where Blankinship claims to have been conducting operations.

10.2.2 Blankinship claimed that he had a small place at a ranch between BNL and Davis Monthan AFB. Unfortunately, Blankinship could provide no details of the owner/operator of the ranch or the location. This is the only location in Tucson where Blankinship had such difficulty recalling details of where he allegedly processed solvents.

ADEQ Response: Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed.

10.3. Equipment Used for Collection and Recycling

Blankinship provided testimony concerning trucks, trailers and equipment that he used for collecting and recycling solvents. Much of this equipment could not possibly have been used to collect or recycle solvents that would have been disposed of in the BNL or BSL. No reports of independent evaluation of equipment (such as filters and distillers) verifying such equipment would work for recycling solvents as claimed by Blankinship have been provided. Several trucks and trailers Blankinship claimed to have used for solvent collecting, recycling and disposal at BNL and BSL did not even exist or belong to Blankinship during those time frames. Examples include:

10.3.1 Assertion: Blankinship testified that he used the truck shown in Exhibit 12 of his deposition to lift barrels using the winch on this truck onto other trucks. He referred to this as a "cheap Hyster".

Comment: The model year of this truck is not known, however the stylized "N" visible on the door of the truck is a registered trademark issued to

Nationalease by the US Patent and Trademark Office. The "N" was first used in 1976 according to USPTO registration records. This truck did not exist and could not have been used by Blankinship for any purpose related to the BNL or BSL as both landfills were closed before this truck was in use.

10.3.2 Assertion: Blankinship testified that he used the trailer pictured in Exhibits 17 and 18 of his deposition to haul barrels. He testified about the benefits of the fold down ramps and winch to load barrels onto this trailer.

Comment: The Arizona motor vehicle record for this trailer shows it was manufactured in 1977. This trailer did not exist and could not have been used by Blankinship for any purpose related to the BNL or BSL since they closed before this trailer existed.

10.3.3 Assertion: Blankinship testified that he used the trailer pictured in Exhibit 20 of his deposition to haul drums of solvent.

Comment: The Arizona motor vehicle record for this trailer shows it was manufactured in 1982 and acquired by Blankinship associate James Partenheimer in October 1994. The reasons this trailer could not have been used by Blankinship for any purpose related to the BNL or BSL in the 1950's-1970's are self-evident.

10.3.4 Assertion: Blankinship testified that he used the truck pictured in Exhibits 31 and 32 of his deposition to haul drums. He testified that he could use the winch to lift full barrels.

Comment: The VIN and information plate on the chassis of this truck show it to be a model year 1991 Dodge Ram 150. The reason this could not have been used by Blankinship for any purpose related to the BNL or BSL in the 1950s – 1970s is self-evident.

10.3.5 The stills Blankinship claimed to have used in his testimony are not designed (and likely would not work) for solvent recycling. However, Blankinship only testifies to distilling carbon tetrachloride. He never testified that he distilled PCE. Carbon tetrachloride is not a contaminant of concern at BNL or BSL.

ADEQ Response: Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed.

10.4. PCE and Solvents from Dry Cleaners

Blankinship never testified with any degree of certainty regarding the identity of the chemicals contained in the solvents he claimed to be recycling. Upon further questioning concerning the chemical identity of solvents, Blankinship testified they were just "solvents" that were good degreasers or good for cleaning. He testified that he collected solvents from and sold solvents to dry cleaners. Blankinship never testified that any of these dry cleaning solvents contained PCE. In fact his descriptions of the dry cleaning solvents (including recycled solvents that he sold to dry cleaners) rule them out as being PCE or TCE.

The evidence that the dry cleaning solvent Blankinship worked with was not PCE or TCE includes the following:

10.4.1 Blankinship testified that the dry cleaning solvents he collected were much lighter and very lightweight material.

10.4.2 PCE has a density of 1.62 grams/cm³ while TCE has a density of 1.46 grams/cm³. This means that PCE is 1.62 times heavier than water and TCE is 1.46 times heavier than water. These could hardly be considered very lightweight solvent.

10.4.3 Blankinship testified that one of his best clients, Supreme Cleaners, had an explosion due to this dry cleaning solvent blowing up.

10.4.4 PCE and TCE are not flammable liquids. Therefore they could not explode or blow up like Blankinship testified.

10.4.5 Stoddard solvent is one known flammable solvent that was used for dry cleaning. The density of Stoddard solvent is only 0.78 grams per millimeter making it less than half the weight of PCE and TCE for the same given volume.

ADEQ Response: Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed.

10.5. Chemical Analysis of Solvents Allegedly Collected and Recycled

Blankinship claims to have had solvents analyzed for chemical content. ADEQ interviewed people who Blankinship reportedly hired to perform solvent analysis yet none of them could produce a report. In fact, many of these people stated they never analyzed samples for Blankinship. Interview summaries prepared by AQEQ's investigator listed the following entities that may have performed testing of solvents

for Blankinship: Turner Laboratories, Jacobs Assay Office, Bruce Halstead, Cornelius Steelink, and Arizona Testing Labs

10.5.1 Turner Labs. Blankinship claimed to have taken samples of solvent to Turner Laboratories in Tucson. Turner personnel said they didn't know Blankinship or test any solvents for him. Of special interest is Woody Turner's comment stating that Blankinship's claimed method of diatomaceous earth filtering would not clean dirty solvent. Turner, having more than 40 years of experience in chemistry, is the only referenced expert who has commented on Blankinship's so-called solvent recycling process.

10.5.2 Jacobs Assay Office. Blankinship claimed that he may have taken samples of solvent to Jacobs for analysis. Mike Jacobs advised that he did not analyze samples of solvents for Blankinship.

10.5.3 Bruce Halstead. Blankinship claimed that Bruce Halstead analyzed samples of solvents for him. Bruce Halstead is deceased however his son Larry Halstead said he would have records of testing if any was performed for Blankinship. ADEQ sent investigators to Halstead but have failed to provide any reports of Blankinship solvents. If ADEQ found reports of chemical analysis, there is no acceptable reason for failing to release such reports.

10.5.4 Cornelius Steelink. Steelink was interviewed by ADEQ investigators. Steelink knew of Blankinship but never performed any solvent analysis for him.

[NOTE—There is no paragraph 10.5.5 included in the letter.]

10.5.6 Arizona Testing Laboratory (ATL). Blankinship claims that ATL performed testing of solvents for him. No reports of solvent analysis or other information indicating they analyzed Blankinship's solvents were identified or provided.

ADEQ Response: Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed.

10.6. Blankinship Associates with Chemical Expertise. Blankinship repeatedly named two associates who he claimed were experts in chemistry and knew about the chemical nature of the so-called solvents he was collecting and recycling. These two associates were Henry Mann and Oliver Kendall. Blankinship claimed that Kendall taught him and Mann how to recycle solvents.

10.6.1 Henry Mann. Blankinship claimed Mann was a chemist with a degree in chemistry. No evidence to support such claims was provided by

Blankinship or ADEQ. A newspaper article about Mann's life listed Mann as a metallurgical engineer. The newspaper article was recovered in documents that survived the fire Blankinship plead guilty to setting in trailers at Tucson International Airport.

Interview summaries of Mann's family members were conducted by ADEQ investigators. Mann's family members confirmed that Mann was a metallurgist and also claimed Mann was a con artist.

10.6.2 Oliver Kendall. Blankinship testified concerning an associate, a Mr. Kendall who was a Ph.D. chemist from England. He also testified that Kendall was a professor who got picked up for having a lot of gold and was sent to prison. Blankinship testified that he got Kendall out of prison because of his age.

Kendall the chemist was James E. Kendall, a person featured in a June 1937 Popular Mechanics magazine which Blankinship referenced.

Kendall the Blankinship associate was convicted felon Oliver O. Kendall, Federal Bureau of Prison Inmate #11654-TA. Kendall was convicted of interstate securities fraud in El Paso Texas and sentenced to three years prison. Kendall was conditionally released from Federal Prison on September 8, 1956 according to court and prison records. Consequently, any activities about which Mr. Blankinship testified that were undertaken together with Mr. Kendall were conducted following Pima County's departure from the BSL.

ADEQ Response: Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed.

10.7. ADEQ Failed to Authenticate Claims Made by Blankinship

ADEQ took Blankinship's claims and testimony at face value without verifying the veracity of those claims. For example (as discussed in previous comments), ADEQ investigators accepted Blankinship's testimony about using trucks and trailers that were not even manufactured until 10-20 years following closure of the BNL. Simple MVD checks of license plates, VIN numbers or looking at the vehicle ID plate on the door post would have shown these vehicles could not have been involved in collection, recycling or disposing of contaminants of concern at BNL or BSL.

Other claims by Blankinship clearly show major discrepancies. For example, Blankinship claimed that Oliver Kendall taught him and Henry Mann how to recycle solvents. Blankinship identified a fenced area where Mann recycled solvents in the northeast corner of the Blankinship trailer park. Aerial photos of this area occupied by Mann show piles of materials, trailers and other objects Blankinship

claimed were used in the recycling process. The piles of materials in this northeast comer attributed to Mann are present in the aerial photos beginning in 1973. Aerial photos from 1969 and 1971 showed this comer was vacant. Oliver Kendall died January 4, 1966.

ADEQ investigators readily chased down people who Blankinship referred them to yet they failed to independently seek out and interview other parties who had pertinent information. For example, ADEQ failed to seek out Oliver Kendall's son to see if he had any records or other information concerning his father's expertise or activities with Blankinship.

ADEQ Response: Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed.

10.8 Blankinship's Criminal Background

Not only did Mr. Blankinship already have a long criminal history (see the rap sheets attached as Exhibit "E") when he was enlisted to be ADEQ's key (and in most cases, its sole) witness, the Supreme Court had previously upheld his conviction for assaulting law enforcement officers. (See, State of Arizona v. Joe Ernest Blankenship, 99 Ariz. 60, 406 P.2d 729 (1965). [Name misspelled in the original.]) And yet, ADEQ proceeded to offer Blankinship blanket immunity from prosecution in exchange for his geyser of insupportable accusations.

Of the numerous criminal violations reflected in Exhibit "E", the last is the most telling. While testifying about his role in the disposal of wastes in the Tucson valley, he set fire to his own office located near the Tucson International Airport, burning nearly all of his records related to his business – including records related to this case. He was arrested and plead guilty to the lesser included offense of Criminal Damage in the Sixth Degree, a felony. Mr. Blankinship was still under probation for that crime when he died. Records related to that case can be found at the conclusion of Exhibit "E".

In this regard ADEQ may wish to keep in mind the first of Arizona's standard jury instructions: "Standard Instruction Number 1: Impeachment with Felony Conviction. Evidence that a witness has previously been convicted of a felony may be considered only as it may affect the credibility of that person as a witness." A reasonable course of action in this case would be to completely discount Mr. Blankinship's testimony.

ADEQ Response: Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed.

Comments from Jorden Bischoff & Hiser, P.L.C.

Comments regarding the Draft LOU RI Report were received in a letter from the Jorden Bischoff & Hiser, P.L.C. on behalf of Tucson Electric Power Company, dated February 25, 2014. The following section includes the text of comments in boldface italics, along with the ADEQ response to address each comment.

We are writing on behalf of Tucson Electric Power Company (TEP) in regards to the Draft Remedial Investigation Report, Broadway-Pantano WQARF Site, dated November 15, 2013 (the Draft RI). These comments are in addition to those submitted by Golder Associates, dated February 25, 2014 and those comments are incorporated by reference. TEP has grave concerns regarding the Draft RI's reliance on "testimony" and interview summaries of a single solvent recycler in attempting to determine the alleged extent of contamination at the properties in question. TEP appreciates this opportunity to provide these comments and looks forward to receiving the Arizona Department of Environmental Quality's (ADEQ's) responses.

ADEQ's Draft RI references information gathered from a certain individual as the basis for conclusions regarding the types and amounts of materials disposed of at the landfill, including interview summaries prepared by a consultant. Using this information as a basis for determining the extent and types of materials contributed to the landfill by Tucson Electric Power is flawed at best.

Specifically, the Draft RI states

"Former municipal waste haulers, private waste haulers, and solvent collectors and recyclers recalled collecting waste that included the Site contaminants of concern (COCs) from commercial and industrial businesses in those areas and disposing of the waste at the BNL [Broadway North Landfill] and BSL [Broadway South Landfill]. (HGL, 2012). Concentrations of tetrachloroethylene (PCE), trichloroethene (TCE), and vinyl chloride (VC) above Arizona Aquifer Water Quality Standards (AWQSs) have been detected in groundwater at the site."

Draft RI, p. 1. The Draft RI also provides that it is based on HGL's report which, in turn, relied on interview summaries of waste haulers and a solvent recycler. Draft RI, p. 43. The Draft RI concludes:

HGL's report includes testimony provided by a solvent collector and recycler. The recycler collected spent solvent and other chemicals from the Tucson, Phoenix, southeastern Arizona, and San Diego areas. After filtering the spent solvent, the still bottoms and other residues were disposed of in the BNL and BSL. If the solvents could not be recycled because they were too contaminated, the solvents were put directly into the landfills. The solvent

recycler favored the BNL and BSL because they were open to the public and there were no gate fees.

Id. These statements make it clear that the Draft RI is based on assumptions gleaned from HGL's interview summaries of the solvent recycler, presumably Mr. Ernest Joseph Blankinship.

Reliance on the summaries in drawing any sort of conclusions is unfounded, for several reasons. First, the interview summaries are not first-hand accounts of activities conducted by Mr. Blankinship. Rather they are an interviewer's interpretation of the interview and, in many cases, do not accurately reflect the statements made during the interview. In sworn testimony, Mr. Blankinship refuted the contents of several interview summaries when asked about the number of times he would deliver materials from TEP properties to the landfill, the amount of material he would pick up from TEP properties, that most liquids collected from TEP were transmission oil and that he was not able to collect any records of sampling results or other analyses of liquid wastes collected from TEP properties. Clearly, if the interviewee states that the summaries inaccurately reflect his statements, they should not be relied upon as the basis for any conclusions in the Draft RI.

Second, the Draft RI makes assumptions regarding amounts or types of materials collected from TEP (or any other potentially responsible party) properties and disposed of at the landfill based on summaries of Mr. Blankinship despite the fact that Mr. Blankinship, in sworn testimony, could not identify whether solvents were even collected from TEP properties or provide a reasonable estimate of amounts of any materials collected from TEP properties. None of the materials were analyzed to determine what they actually contained. Mr. Blankinship stated that he collected metal, wood, transformer oil, transmission oil and petroleum oil, among other things, from TEP properties. However, Mr. Blankinship could not provide even a rough estimate of the amount of oils or solvents, if any, collected from TEP's properties, how much was recycled or the amount of still bottoms sent to the landfill.

In other words, the assumptions made in the Draft RI are based on inaccurate and incomplete statements, or summaries of interviews. In light of the utter lack of concrete information, the Draft RI should be rescinded and revised so that it is based on facts and not speculation and faulty interpretations of interviews.

ADEQ Response: Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed.

Comments from Adler Murphy & McQuillen LLP

Comments regarding the Draft LOU RI Report were received in a letter from the Adler Murphy & McQuillen on behalf of Tucson Airport Authority, dated February 25, 2014. The following section includes the text of comments in boldface italics, along with the ADEQ response to address each comment.

In addition to the comments made by Golder Associates, on behalf of TAA and other parties, to the Draft Remedial Investigation Report of the Landfill Operable Unit, I make the following comments on behalf of TAA regarding this draft RI, in particular the findings in the report of HydroGeoLogic, Inc. (HGL, 2012) which discusses the information obtained by ADEQ contractors and staff from the “solvent recycler” Joe Blankinship. It is appropriate at this time to comment on the HGL report, which was incorporated into the GOU Remedial Investigation (RI) after the public comment period was closed, and thus has never been available for public comment. In addition, it is clear that the LOU RI also relies on information cited in the HGL report, as explained by Golder Associates in the separately filed technical comments.

It is clear from the GOU and LOU Remedial Investigation Reports that ADEQ and its contractors rely mainly, if not exclusively, on the statements of Mr. Joe Blankinship regarding his own purported activities at the site. This is a serious error.

Mr. Blankinship’s history and his own testimony clearly illustrated that he is not reliable or credible and that ADEQ’s reliance on him is highly misplaced. It is our understanding that despite the lack of credibility shown in the numerous—but no means exhaustive—examples listed below, the ADEQ entered into an agreement with Mr. Blankinship in which the ADEQ would cover Mr. Blankinship’s portion of liability in exchange for his cooperation and testimony. Mr. Blankinship has referred to this agreement as his “get out of jail free card.” Mr. Blankinship is a well-known teller of tall tales (additional examples of this trait are easily found on YouTube). He has been treated for mental illness, and has a five-decade long criminal history.

ADEQ should not rely on him in any way. His misleading information will adversely affect decisions necessary for a proper remediation, and cause the needless waste of the State’s and private parties’ resources. Below are some representative statements demonstrating Mr. Blankinship’s untrustworthiness and inaccuracy. There are many more to cite. We obtained this information from his sworn testimony, public records, court transcripts and videotapes of his statements.

Important “Friends”: Mr. Blankinship claims to have personal relationships with many famous people. A much abbreviated list follows:

Mr. and Mrs. Albert Einstein (he thought Mrs. Einstein was “the brains” of the couple) President Franklin Delano Roosevelt (as a child he claims he massaged the President’s polio stricken legs in a spa in Georgia, where the President later died)

Physicist Edward Teller (“Father of the Hydrogen Bomb” with whom he discussed aliens)

Multiple Nobel Prize winning scientist Linus Pauling (who allegedly taught him that medicines should be spun to the left to make them easier to assimilate in the body)

David Koresh (Leader of the Branch Davidian sect that was the subject of a deadly raid by federal agents near Waco, Texas in 1993. He claimed to have spent time at the compound to erect cooling towers, and complained that the sect prayed so long before a meal that the food got cold.

President Richard Nixon and Nixon’s mother (claims he attended the funerals of six U.S. Presidents)

Howard Hughes (who chose Mr. Blankinship’s mother’s hamburger stand to secretly negotiate land deals in the Tucson area)

Frank Lloyd Wright (who he “conned” into designing a swimming pool for his trailer court)

George Washington Carver (renowned botanist who died in 1943 in Alabama when Mr. Blankinship was 13)

Jacques Cousteau (although Mr. Blankinship claims he developed some of the first aqualungs, and he went diving with Cousteau, Cousteau developed the twin-hose open-circuit SCUBA system with Emlie Gagnan in 1943 when Mr. Blankinship was 13)

Stephen Hawking (wheel-chair bound British physicist, professor and author of “A Brief History of Time.”)

Astronaut Frank Borman (who he claimed lived in his Benson Highway trailer court, gave his children pictures taken from the moon, and served as Tucson Airport Authority’s Airport Manager [which he never did])

B. Traven, (pen name) mysterious author of “The Treasure of Sierra Madre” (also see below)

Other Tall Tales: He describes a life full of adventures and alleged accomplishments, a few of which are listed below:

While mining for bat guano in the Grand Canyon, he discovered a secret cave that went on for miles containing Egyptian-looking mummies and artifacts. The National Forest Service later blew up the entrance, so no one can find them.

While on a search for uranium at the Grand Canyon, the Ouachita Indian Nation of Poverty Point, Louisiana, sent a tribe member named "Ebay" who followed Mr. Blankinship for two years. In and near the Grand Canyon Mr. Blankinship and Ebay found Indian burial mounds, three pyramids and several male mummies (no females). Mr. Blankinship gave several of the artifacts to the Empress of the Ouachita tribe.

Mr. Blankinship, along with Wilhelm Reich, searched for UFO's at Roswell, NM, experimented on life-extending crystals, and a cure for cancer. (Reich died in 1957 in federal prison for distributing a quack medical device, a telephone-booth size box which he alleged gathered "orgone energy" and could cure common colds, cancer and impotence.)

Mr. Blankinship wrote a 20 page scientific paper for NASA regarding the properties of iron oxide crystals (rust), and such crystals are worn in the shoes of every astronaut..

In an oral statement at a public session of the Pima County Board of Supervisors in 2002, Mr. Blankinship claimed he had one of the nicest labs in all of southern Arizona, that top doctors from all over the world visit him, and he has a world reputation for using lasers and iron oxide crystals to "destructure" water to remove water's "memory." He claimed he could have cleaned the water at John Wayne Airport in Orange County, CA for \$500, but they spent \$5 million.

At the same meeting, he claimed that in apparent retaliation for telling homeowners with flooding problems to sue Pima County, he was subject to a police raid. He further claimed that despite the fact that he has nothing to do with drugs, he has been subject to three drug raids, involving helicopters and SWAT teams. He also implied that the County was behind the power company turning off his electric service.

While prospecting in Mexico he came upon a man who was with three naked children under a tree. The man had not spoken English in a long while. He was a writer and had a typewriter that they would cover to protect from the rain, but he got to read a transcript of a work in progress. As "one of the highlights of my life" Mr. Blankinship claimed he read a draft of "The Treasure of Sierra Madre." In reality, this book was published in 1927, three years before Mr. Blankinship was born.

Mental Health Problems: *In July 1992, Mr. Blankinship filed a civil complaint against Pima County alleging unlawful arrest. In this litigation, Pima County learned that Mr. Blankinship had been treated by a psychiatrist over 20 times, and had been tentatively diagnosed with paranoia and delusional behavior, and put this in the court record. In his 2011 deposition, Mr. Blankinship admitted to receiving psychiatric care from two different psychiatrists, but claimed he was told that he "didn't have a persecution complex," because it was true that he "was being persecuted." Mr. Blankinship refused to give permission to obtain his records that could confirm or refute this.*

Criminal History: *Blankinship has a criminal history five decades long. This history includes, but is not limited to: convictions of obstructing justice, assault with intent to*

commit felony and riot; a plea agreement relating to aggravated assault; and additional charges of forgery, theft, and a third-degree burglary. Finally, between 1987 and 2004 he was cited six times for charges such as no valid driver's license, no proof of insurance, and false reporting to law enforcement.

No Records and Poor Memory of Critical Information: Mr. Blankenship did not produce any records typically generated by a business, such as business logs, customer contracts, canceled checks, receipts, tax returns or any other document substantiating his claims. The only “evidence” is his memory, which he repeatedly claimed to be poor. He claimed memory problems regarding the names of chemicals he handled, periods of time, names of people, frequency of moving chemicals, volumes of chemicals, and number of barrels, and much else.

It appears that ADEQ has acted on Mr. Blankinship’s information as if it were reliable. Undoubtedly this has led to a waste of resources both by the State and the parties that Mr. Blankinship attempts to implicate. Relying on such poor information will cause an inaccurate understanding of the site and is likely to lead to remediation decisions that are incorrect. ADEQ should respond to the comments raised by all parties challenging the reliance on Mr. Blankinship. This response should be in writing and in the form of a presentation to the Citizen’s Advisory Board. If ADEQ upon reflection will not be relying upon Mr. Blankinship’s testimony, then they should so state.

ADEQ Response: Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed.

Comments from Golder Associates

Comments regarding the Draft LOU RI Report were received in a letter from the Golder Associates on behalf of Arizona Board of Regents (for the University of Arizona); Pima County; Raytheon Company; Tomkins Industries, Incorporated; Tucson Airport Authority; Tucson Electric Power Company; dated February 26, 2014. The following section includes the text of comments in boldface italics along with the ADEQ response to address each comment.

GENERAL COMMENTS

Golder Associates Inc. (Golder) was retained by the Office of the Pima County Attorney – Civil Division (County), coordinator for a group of six co-parties, to perform a technical review of the Draft Landfill Operable Unit (LOU) Remedial Investigation (RI) Report for the Broadway-Pantano Water Quality Assurance Revolving Fund (WQARF) Site (Site) located in Tucson, Pima County, Arizona. The draft LOU RI report was prepared for the Arizona Department of Environmental Quality (ADEQ) by Clear Creek Associates, PLC (CCA) and released for public comment on November 29, 2013. Golder’s primary task was to review and provide comments on the technical merits of the RI report. However, in order to develop a more complete understanding of the LOU environment, Golder also reviewed supporting investigation reports and other documentation related to the Broadway North Landfill (BNL), Broadway South Landfill (BSL), and other nearby potential source areas. Many of these documents are cited in the following paragraphs.

1.0 SUMMARY COMMENTS

Site investigation and remedial action activities have been completed at the Broadway-Pantano WQARF Site dating to the 1980s. Much of this work has been, and continues to be, centered on the groundwater operable unit (GOU), which has been defined as the volume of the saturated zone containing volatile organic compounds (VOC) concentrations exceeding Arizona numeric Aquifer Water Quality Standards (Stantec, 2012a). The draft GOU RI report (SECOR, 2007) was released for public review and comment in 2007, and finalized in 2012 (Stantec, 2012a). The final GOU RI report is frequently cited in the draft LOU RI report. The draft LOU RI report also frequently cites a Site history report by HydroGeoLogic, Inc. (HGL, 2012) that was prepared for ADEQ “as part of the GOU RI.” However, it was not released with the draft LOU RI report for public comment. This is particularly significant because the draft LOU report relies heavily on the information presented in HGL (2012), to the extent that it is essential to the presentation and discussion regarding contaminant source material, and therefore an essential part of the report. That this report was not part of the public release of the draft RI report is contrary to ADEQ policy.

The draft RI report (CCA, 2013) focuses on the LOU, which has been defined as including “the closed BNL, the closed BSL, and the vadose zone directly beneath and in close proximity to the BNL and BSL boundaries” (CCA, 2013). The report describes recent investigation tasks and summarizes previous work related to soil and soil vapor investigations at both former landfill properties. Conclusions regarding contaminant source areas, transport

mechanisms, a conceptual site model, and the results of a health risk assessment are presented.

Golder’s review of the draft RI report and supporting documents indicate there are significant deficiencies in the report, including:

- A heavy reliance on unverifiable claims of a former solvent recycler regarding source material and disposal practices at BNL and BSL.*
- The draft RI report relies heavily on referenced documents to the point that the documents are part of the report. However, neither the HGL (2012) nor Stantec (2012b) reports were released as part of the draft RI report.*
- The draft RI report, as well as available cited references, fails to justify the lack of investigation of other potential sources of contamination, including documented former commercial businesses and other upgradient wildcat dumping areas.*
- The report draws conclusions regarding trends in deep soil vapor VOC concentration data at BSL that are unsupported due to the very low number of samples and a large temporal gap in the data set.*
- Additional investigation at the BNL is needed to explain the significant methane concentrations at depth and to provide supporting evidence of reductive dechlorination in the vadose zone and groundwater.*
- The report statements regarding contaminant fate and transport are flawed due to a reliance on non-representative sampling conditions. Furthermore, there is evidence that some samples may have been compromised as they were collected.*
- The report includes speculative statements that are not necessary or are not backed with data or verifiable information. These statements should be removed or modified.*

ADEQ Response: Golder Associates expounds the “general comments” above in their “specific comments” below. Please see ADEQ’s response to the specific comments below.

SPECIFIC COMMENTS

Specific comments regarding these deficiencies and other issues are presented below.

2.0 DRAFT LOU RI REPORT COMMENTS

2.1 Comment No. 1 – Reliance on Referenced Documents and Unverifiable Information

Page 2, Section 1.2 – “In the interest of efficiency, and at the recommendation of ADEQ, previous reports prepared by others are frequently referenced in this RI.”

While this is not an uncommon practice, the presentation of the materials in the draft RI report relies heavily on referenced documents to address and support specific important conclusions. The reliance on referenced material rather than providing clear and succinct arguments within the draft RI report text, even in the form of a brief summary of the work cited, forces the public reviewer to seek out the supporting documents in order to gain a full understanding of the conclusions being presented by ADEQ. Many of these documents were difficult to locate and access within the short public comment period allowed. This significantly hampers the efficiency of the review process and dampens the reviewers’ ability to come to independent conclusions.

ADEQ Response:

Golder Associates states that many documents referenced in the Draft LOU RI Report “were difficult to locate and access within the short public comment period allowed,” yet Golder Associates didn’t even submit its document request to ADEQ until the final month of the public comment period, and ADEQ emailed the requested documents to Golder Associates *within only three days of the request*. Therefore, ADEQ does not know what documents Golder Associates is referring to as being “difficult to locate and access within the short public comment period allowed.” The Draft LOU RI Report public comment period was 91 days--61 more days than required by A.A.C. R18-16-301(c).

Moreover, work at these sites has been ongoing for many years. For this reason, the issuance of the Draft RI should come as no surprise to any party. Ample time to request and review supporting documents by interested parties was available over the years.

The HGL (2012) report on site history and the Stantec (2012b) report on potential historical users of VOCs in the Site area are heavily cited in the draft LOU RI report and therefore are important elements of the draft RI report. However, the relative importance of these documents has been minimized as neither report was released for public review as part of either the draft LOU RI report, or the draft and final GOU RI reports.

The Stantec (2012b) report includes important information on other potential sources of contaminants of concern (COCs) that are located near the Site. A review of the report tables provides the reader with a list of 44 companies and facilities that are either known to have used tetrachloroethylene (PCE) and/or trichloroethene (TCE), or operate within industries that commonly used these solvents as part of their normal operations. This is important information that

is typically brought forward within the pages of an RI report, but in this case are buried in a supporting document and then largely ignored.

The HGL (2012) report provides a history of the landfill operations based primarily on historical documents, aerial photographs, archived newspaper articles, and the summaries of interviews between ADEQ and a former solvent recycler. This document is at the heart of ADEQ’s stance on potential sources of contamination and who may have been responsible for the disposal of materials in the landfill. The report states there are records that indicate commercial and industrial businesses disposed of waste at the two landfills. However, it presents no conclusive and verifiable evidence that ties any particular business to disposed waste, while missing more obvious parties that may have contributed COCs to the landfills.

The importance of these reports to the RI process cannot be understated. Much of the information that ADEQ has included by reference to support its case against potentially responsible parties, or used to justify not investigating other sources more thoroughly, is contained within Stantec (2012b) and HGL (2012). However, much of the information, particularly in HGL (2012), is unsupported and unverifiable. Obvious potential sources are ignored and no credible evidence is presented to support allegations against reported sources of the COCs.

ADEQ Response: ADEQ is required to issue as “draft” for official public comment, milestone-type documents which are specified in A.A.C. R18-16-404. These milestone documents do not include the “*HGL (2012) report on site history and the Stantec (2012b) report on potential historical users of VOCs in the Site area.*” However, these reports are Appendices O and P, respectively, in the Final LOU RI Report.

Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed.

Text summarizing ADEQ’s evaluation of Stantec’s May 1, 2012 “Potential Historical Users of Tetrachloroethene and/or Trichloroethene, Broadway-Pantano WQARF Site” report has been added to the end of section 4.2 of the Final LOU RI Report. This text is as follows:

In 2012, ADEQ’s contractor Stantec updated and expanded (to include BSL) SECOR’s 2001 Regulatory Agency and Historical Records Review for the Site. This expanded review was performed so that ADEQ could determine whether existing information justified additional field investigation of other facilities potentially contributing to the Site groundwater contamination. ADEQ evaluated the following:

- *Environmental and other records of facilities located at and near the Site that potentially could be (or could have been) users of PCE and TCE were reviewed to see if PCE or TCE use and release were documented for those facilities at the indicated locations. If there was a PCE or TCE release at the facility, ADEQ evaluated the available information on the release (e.g., date of spill, volume, physical state, clean-up response, etc.). [Is there enough evidence of a significant PCE or TCE release for one to suspect possible groundwater impact?]*
- *The locations of these facilities in relation to the Site groundwater contamination and flow direction. [Is the release location within or upgradient of existing plume (without a “clean” well between the location and the plume?)]*
- *Groundwater plume anomalies or other groundwater data supporting the existence of another source.*

Fifty-nine facilities were reviewed and no justification was found for performing field investigations of any of them. Details of this records review can be found in the referenced report (SECOR, 2001; Appendix P).

2.2 Comment No. 2 – Potential Sources

Page 44, Section 4.2 – “ADEQ has determined from this records review, the locations of these facilities, the locations of the Site plumes, and groundwater flow directions at various Site locations that it is unlikely that these facilities contributed (or are contributing) to the Site plumes and thus they do not warrant field investigation.”

ADEQ cites the Stantec (2012b) report on potential historical users of PCE and/or TCE as the source of information to support this statement. The Stantec report is a summary of a routine potential source investigation and lists a significant number of facilities within the vicinity of the Site that may have used solvents as part of their historical processes. The list of facilities includes dry cleaning facilities, laundry services, automotive repair facilities, gas stations and service departments, and Resource Conservation and Recovery Act hazardous waste generators. However, the report summary does not include any conclusions regarding how likely it may be that these facilities have contributed to the contamination associated with the Site. The list includes several dry cleaning facilities with operations that date to the 1960s that were (or are) located along the Broadway Road corridor west of the landfills. Of particular importance are several facilities that were located in close proximity to monitor wells that have yielded samples containing COCs, including monitor wells B-10 and B-8. Records for one of these facilities (One-Hour Martinizing at 7258 East Broadway Road) include a reported spill of dry cleaning still bottoms. A self-service dry cleaning facility (Stan’s Spic

N Span Laundry at 7340 East Broadway Road), which operated from 1962 to 1973, was also adjacent to the present location of monitor well B-10. The presence of PCE in samples collected from wells B-10 and B-8 appears to be the primary justification for the conclusion that a groundwater plume from the BSL is comingling with the plume from the BNL, which led to the inclusion of the BSL in the WQARF Site in 2005.

An examination of Figures 2 and 3 in the Stantec (2012b) report suggests many potential users of chlorinated solvents are, or were, located directly upgradient of the mapped plume at various times. If these commercial facilities were considered to be viable sources of the contamination observed in nearby monitor wells, the historical configurations of the mapped plume north of Broadway Road might look considerably different and the plume underlying the BSL could be confined to wells located entirely within the boundary of the landfilled area. A BSL plume map confined within the landfilled area raises questions about the source of PCE in groundwater at monitor well BP-22 at the far southern end of the BSL. Is the PCE at this location due to material landfilled within the BSL, or are there other sources upgradient of the BSL?

Given the relative importance of these data with regard to source determination, plume orientation, and the layout of the Site as a whole, proximity to the monitor wells with elevated PCE concentrations alone should have resulted in a close examination of these potential sources. The draft RI report fails to provide justification for the exclusion of the numerous nearby potential sources within the text of the report, where it belongs.

ADEQ Response: Text summarizing ADEQ’s evaluation of Stantec’s May 1, 2012 “Potential Historical Users of Tetrachloroethene and/or Trichloroethene, Broadway-Pantano WQARF Site” report has been added to the end of section 4.2 of the Final LOU RI Report. This text is as follows:

In 2012, ADEQ’s contractor Stantec updated and expanded (to include BSL) SECOR’s 2001 Regulatory Agency and Historical Records Review for the Site. This expanded review was performed so that ADEQ could determine whether existing information justified additional field investigation of other facilities potentially contributing to the Site groundwater contamination. ADEQ evaluated the following:

- *Environmental and other records of facilities located at and near the Site that potentially could be (or could have been) users of PCE and TCE were reviewed to see if PCE or TCE use and release were documented for those facilities at the indicated locations. If there was a PCE or TCE release at the facility, ADEQ evaluated the available information on the release (e.g., date of spill, volume, physical state,*

- clean-up response, etc.). [Is there enough evidence of a significant PCE or TCE release for one to suspect possible groundwater impact?]*
- *The locations of these facilities in relation to the Site groundwater contamination and flow direction. [Is the release location within or upgradient of the existing plume (without a “clean” well between the location and the plume?)]*
 - *Groundwater plume anomalies or other groundwater data supporting the existence of another source.*

Fifty-nine facilities were reviewed and no justification was found for performing field investigations of any of them. Details of this records review can be found in the referenced report (SECOR, 2001; Appendix P).

2.3 Comment No. 3 – Possible Presence of Containerized NAPL

Executive Summary – “(However, the BNL and BSL could still contain waste, possibly in containers, that could be released to the vadose zone in the future,[sic])”. Page 23 - “However, the possibility that containerized NAPL in the waste and/or isolated pockets of NAPL in the vadose zone are present cannot be ruled out.” And Page 52 – “...residual NAPL may still be present in isolated pockets of waste or in containers within the waste.”

These statements regarding the possible presence of containerized non-aqueous phase liquid (NAPL) are completely speculative and based on the unverifiable summaries of interviews between a former solvent collector and recycler and ADEQ (see Comment No. 1). As noted above, this information is not supported by factual information. If ADEQ believes that the presence of containerized wastes is likely and provides an imminent or future threat of release to the subsurface environment, we recommend that additional steps be taken to further characterize the waste material and incorporate that information into Site remediation plans. Characterization activities could include:

- Ground surface sweeps to monitor the entire surface of the landfills for discharges of VOC vapors and landfill gases. Surface sweeps are a common and relatively inexpensive means of identifying hot-spots that could be targeted for additional investigation or landfill gas control.*
- Surface geophysical surveys, including magnetometer, electromagnetic, and ground-penetrating radar.*
- Test pit excavation into and through the waste material at areas targeted by other methods.*
- An exploratory drilling program with locations targeted by the results of other evaluation methods.*

Barring further investigation, any references to containerized NAPL and the implied threat of release to the environment must be justified with verifiable source information, or deleted from the text of the draft RI report.

ADEQ Response: The quoted text above taken from the Draft LOU RI Report is based on the many years of groundwater and soil gas data from samples collected below the BNL and BSL, as well as HGL’s historical research which indicates that there were no restrictions on the type of waste deposited in these landfills. Therefore, it is reasonable to indicate in the Draft LOU RI Report that there is a possibility that PCE or TCE NAPL waste-containerized or not--could exist within the BNL and/or BSL and that this waste could be released in the future. It would not only be unwise, but also inappropriate for ADEQ to proceed with the FS with the assumption that all PCE and TCE in the landfill have already been released to the vadose zone.

The first bulleted subsection within Section 3.1.5 of the Draft LOU RI Report briefly discussed the gridded shallow soil gas survey performed at BNL by a contractor for City of Tucson in 1996. The text indicated that there were five areas of elevated concentrations but it did not include the following: The survey indicated some areas containing relatively elevated PCE concentrations and the City of Tucson installed boreholes and performed additional soil gas testing in these areas. Based on the soil gas results (and historical records), three of these boreholes were completed with permanent soil gas probes (with the wells ranging from 60’-100’ deep). The City of Tucson also installed deep soil gas wells (approx. 193’ deep, wells DP-1, DP-2, and DP-3) in areas of the relatively elevated PCE concentrations. Section 3.1.5 has been revised in the Final LOU RI Report to include a summary of this additional information.

Given that the BNL and BSL is likely to contain other large metal items besides drums, it is not appropriate or cost-effective to perform such geophysical surveying and/or test pit exploratory programs unless there is documented evidence to suggest the specific existence of large discrete areas of drum disposal.

2.4 Comment No. 4 – Rising Soil Gas Concentrations at BSL

Executive Summary, Page 38, Section 3.3.3, and Figure 22. “VOC concentrations in soil gas at BSL appear to be increasing. This is consistent with increasing PCE concentrations in groundwater observed at BP-23 and BP-22 at BSL.”

This statement in the Executive Summary is misleading and discounts the importance of the lack of data and difficulty in discerning trends. After reading the Executive Summary a casual reviewer might assume that there are substantial data supporting the statement. However, for most of the deep soil gas probes there are data from only two samples collected in 2006 and one sample in 2013, leaving a substantial temporal gap in the data set. A more

accurate statement would be that the 2013 concentrations appear to be higher than the 2006 measurements. However, the lack of data between 2006 and 2013 makes it impossible to determine if VOC concentrations have been increasing or decreasing over time. Likewise, implying that the “trend” in soil vapor concentration is directly linked to any rise in groundwater concentration is also speculative. The data provide a snapshot of soil vapor concentration in 2006 and 2013, but no statements can be made about the intervening period. Drawing any other conclusion from these data is highly speculative.

This statement is all the more important because of the possible implications for remedial alternatives. If soil vapor concentrations under the landfill are on the rise, along with the implied threat of vapor migration and impact to groundwater quality, then an aggressive remedial option may be recommended. If, on the other hand, soil vapor concentrations are low and decreasing, the range of viable remedial options may be larger. ADEQ needs to have sufficient data to justify a remedial alternative. There currently are insufficient data to support a remedial alternative.

The reliance on a single snapshot of 2013 conditions and drawing conclusions about the long intervening periods results in unsupportable conclusions and may result in remedial actions that are not fully supported by the data. To this point, ADEQ would be best served by collecting more soil vapor and groundwater quality data to support their conclusions.

In addition, Figures 21 and 22 in the draft RI report should be revised and clarified. Each individual graph should be able to function as a stand-alone figure within the larger figure. A larger font size, larger data points, and axis titles with concentration units would make these figures far more understandable than they are now.

ADEQ Response: The text in the Final RI Report and Appendix E has been revised to indicate that the concentrations *are* higher in 2013 than 2006. As indicated in the revised “Summary, Data Gaps, and Conclusions” section of the Final LOU RI Report, ADEQ recognizes that additional sampling of these probes is needed.

Regarding Golder Associates’ comments concerning Figures 21 and 22, this is a typical, industry-standard way of presenting data. When printed or viewed at 100% scale these figures are readable. Axis labels were not included in an effort to keep the graphs as large and readable as possible. Instead, the legend of the figure clearly indicates that PCE sampling results are displayed in mg/m³. The inset figures are also included in Appendix E4 as individual figures; the Final RI Report has been revised to include references to Attachments E4.1 and E4.3 in Appendix E whenever Figures 21 and 22, respectively, are mentioned.

2.5 Comment No. 5 – Soil Gas Concentrations at BSL

Page xii, Executive Summary – “At BSL, soil gas samples from deep-nested soil gas probes had concentrations of VOCs that were higher than those detected at BNL.” Page 48, Section 4.5, First Bullet - “These are higher than the highest PCE concentration in soil vapor detected at BNL of 2.2 mg/m³ from WR-273A at 220 feet bls.”

These statements have no relevance to the discussion about BSL soil gas. The concentrations values are what they are because the BSL and BNL are different landfills with different histories, and contain different volumes and types of waste materials. They also have different remediation histories. The BNL soil vapor concentrations have been mitigated by the operation of an extraction system during the early 2000s. It might be more relevant to compare the current BSL concentrations against BNL concentration values compiled before the vapor extraction system was in place, but in lieu of this it is recommended that these statements be dropped from the text.

ADEQ Response: BNL and BSL are both sources of the Broadway-Pantano WQARF Site contaminant plume. As such, it is important to assess their relative current and potential future contributions to the plume. The conceptual site model indicates that dissolution from soil gas is the primary mechanism of contaminant transport to the groundwater. Therefore, a comparison of current soil gas concentrations at each location is warranted and necessary.

Related to the discussion about BSL soil gas is the lack of information in the draft RI report pertaining to the methane extraction system that has been installed at BSL as required by development plans and City of Tucson Ordinance No. 10037. The system includes methane extraction wells, perimeter sampling probes, gas monitors, header piping, blowers and a gas flare system. While the system was constructed as a methane extraction and mitigation system, it is reasonable to expect that other soil gases, including COC vapors, if present, would also be extracted when the system is operated. Depending on the depth and construction of the extraction wells, operation of the system could have a significant effect on the vadose zone environment that might skew the conclusions presented in the draft RI report if not taken into account. We would not have expected the owners to collect and analyze samples for VOCs because the city ordinance did not require that of them. However, the presence of this system offered an opportunity for ADEQ to learn more about the BSL vadose zone environment, and the potential effect of this system should have been mentioned in the report. We understand through correspondence between ADEQ and Pima County that the system blowers are operated for 4 hours each day. We recommend that ADEQ investigate the cumulative effect of this system on the deep vadose zone environment before providing any conclusions

regarding the relationship between deep soil vapor concentrations and underlying groundwater concentrations beneath the BSL.

ADEQ Response: The existing methane mitigation and monitoring systems at the BNL and BSL are regulated and reviewed by the City of Tucson Fire Prevention and City of Tucson Environmental Services Departments, respectively, not ADEQ. Methane is not regulated under WQARF. However, ADEQ does realize that the methane mitigation system is likely removing non-methane contaminants and, thus, if either system were shut down, a shallow soil gas evaluation would need to be performed after shutdown. Given that the methane mitigation system is located at the landfill boundaries and at shallow depths, its impact on vapor transport of contaminants down to groundwater is likely negligible.

2.6 Comment No. 6 – Potential Sources

Page 43, Section 4.2 – “HGL’s report includes testimony provided by a solvent collector and recycler.”

The interview summaries included with the HGL (2012) report by attachment focus solely on the statements of the solvent recycler as they pertain to his reported operations and subsequent disposal of material at BNL and BSL. These summaries reportedly contain only a small fraction of the volume of the documented interview provided by the witness to ADEQ. This information is unsubstantiated and unverifiable. Furthermore, the act of condensing large amounts of information into a few short summary documents invites interpretation by the document authors, which can result in errors as well as the loss of necessary detail and context.

The summaries and citations within the HGL report and the draft LOU RI report lack sufficient detail to allow a reviewer to assess the accuracy of the information or the veracity of the person interviewed. Instead, the reviewer must take the word of the report authors and ADEQ at face value and accept the information as provided. ADEQ cannot rely on these interview summaries in the draft RI report to support conclusions about source materials or how the materials were allegedly transported to and disposed at the BNL or BSL.

ADEQ Response: Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed.

2.7 Comment No. 7 – Potential Sources

Page 44, Section 4.2 – “Based on the preceding information, Stantec’s (2012b) conclusions regarding the sources of groundwater contamination at the Broadway-Pantano WQARF site are consistent with groundwater quality and soil gas data. Stantec stated, “The BNL and BSL landfilled areas are the

primary and secondary sources, respectively, of the VOC impacts to groundwater within the GOU.”

The “preceding information” is based solely on the unverifiable summaries of interviews provided by the former solvent recycler who reportedly disposed of contaminated materials at the BNL and BSL. The statement in Section 4.2 differs from those made in the initial paragraph of the Executive Summary, which states “The Broadway North Landfill (BNL) and Broadway South Landfill (BSL) are the sources of the dissolved volatile organic compounds (VOCs) in groundwater...” (emphasis added). The statement within the Executive Summary is not warranted because it implies that BNL and BSL are the only sources, whereas there are many documented wildcat dumping sites and other potential sources within the vicinity of the Site. The Stantec (2012b) report on potential historical users of TCE and PCE identified 44 facilities or businesses of a type that may have utilized chlorinated solvents, several of which were confirmed users of PCE, such as dry cleaners. This statement should be revised to more accurately reflect the information provided in the referenced document, preferably in the context of a discussion providing justifications for not investigating these potential sources further.

ADEQ Response: The first sentence in the Executive Summary referenced above has been changed from *are the sources* to *are the major sources*.

Text summarizing ADEQ’s evaluation of Stantec’s May 1, 2012 “Potential Historical Users of Tetrachloroethene and/or Trichloroethene, Broadway-Pantano WQARF Site” report has been added to the end of section 4.2 of the Final LOU RI Report. This text is as follows:

In 2012, ADEQ’s contractor Stantec updated and expanded (to include BSL) SECOR’s 2001 Regulatory Agency and Historical Records Review for the Site. This expanded review was performed so that ADEQ could determine whether existing information justified additional field investigation of other facilities potentially contributing to the Site groundwater contamination. ADEQ evaluated the following:

- *Environmental and other records of facilities located at and near the Site that potentially could be (or could have been) users of PCE and TCE were reviewed to see if PCE or TCE use and release were documented for those facilities at the indicated locations. If there was a PCE or TCE release at the facility, ADEQ evaluated the available information on the release (e.g., date of spill, volume, physical state, clean-up response, etc.). [Is there enough evidence of a significant PCE or TCE release for one to suspect possible groundwater impact?]*
- *The locations of these facilities in relation to the Site groundwater contamination and flow direction. [Is the release location within or*

upgradient of the existing plume (without a “clean” well between the location and the plume)?]

- *Groundwater plume anomalies or other groundwater data supporting the existence of another source.*

Fifty-nine facilities were reviewed and no justification was found for performing field investigations of any of them. Details of this records review can be found in the referenced report (SECOR, 2001; Appendix P).

2.8 Comment No. 8 – Potential Sources – Wildcat Dumping

Page 44, Section 4.2 – “Additionally, the sand and gravel mining operations used as ‘wildcat’ dumping sites are considered to be a third source of groundwater contamination in the GOU.”

The inclusion of “wildcat” dumping at sand and gravel operational sites as a potential source of contaminants associated with the Site is also based primarily on the unsubstantiated summaries of the interviews of the solvent collector and recycler by ADEQ. While the prospect of wildcat dumping cannot be discounted, there is little evidence provided, other than the interview summaries of the solvent recycler, that such dumping could have resulted in the release of contaminants at the site. As noted above, this information is unverifiable and unreliable, but the reader is forced to accept it at face value rather than on merit.

The discussion of wildcat dumping also discounts the possibility of dumping that may have occurred at other sand and gravel operations upgradient of the Site and within Pantano Wash. According to the interview summaries, such dumping occurred along the west bank of the wash adjacent to the landfilled areas. This just as easily could have occurred within the wash further to the south and southeast, or another gravel operations near 22nd Street where access to the wash would have been easier due to the absence of a bridge over the wash at that time.

ADEQ Response: At all landfills, wildcat dumping cannot be discounted.

Comments addressing the PRP investigation and potential liability of PRPs are inappropriate at this stage of the RI and will not be addressed.

2.9 Comment No. 9 – VOCs in Soil Gas – Distribution of VOCs

Page 48, Section 4.5 – “The distribution of VOCs in soil gas cannot consistently be correlated to a single factor such as depth, lithology, location, or physical properties of the COC. Rather, it appears that VOC concentrations in soil gas are affected by many factors, including some that cannot be characterized,

such as the location(s) of the release(s), and the possible presence of residual NAPL.”

This statement should be modified, because work can be directed at locating where the release is coming from (or the areas of the landfills with higher landfill gas and alleged solvent sources). There could be more work done to delineate sources. A surface sweep to measure emissions through the landfill cover (measuring landfill gas and VOCs) could be useful to delineate the more active gas-generating and VOC emitting areas where targeted remediation could take place.

The presence of significant concentrations of methane at 300 feet below the landfills indicates either (1) the landfills continue to generate landfill gas at high enough pressures to move the gas down to the groundwater table, or (2) the methane gas is stagnant and essentially stuck in the vadose zone. These two different scenarios have significant bearing on the selection of potential remedial actions. Further investigation is needed to help identify the cause of the deep methane concentrations.

The shallow temporary soil gas probes may have been too shallow (5 feet deep) to effectively evaluate the exposure risk. Trash was not observed in several of the shallow borings and the landfill cover has been mapped to be much thicker than 5 feet in the BSL. A more effective evaluation would have been to obtain soil gas samples from within the refuse body, rather than potentially above the refuse.

ADEQ Response: ADEQ has collected extensive soil-gas measurements over an extended time period at BNL that indicate there has generally been no significant change in gas concentrations with depth since the cessation of SVE/AI activities in 2002. At BSL, two deep soil-gas sampling events have been conducted at multiple locations, one in 2006 and the other in 2013. The more recent 2013 data clearly show higher VOC concentrations than those detected in 2006 in approximately half of the deep soil gas probes. This suggests that VOCs are still being generated within the landfill and are migrating through the vadose zone. Rising groundwater concentrations at BSL may also indicate that landfill gas pressures are still high enough to move contaminants down to the water table. ADEQ will periodically monitor soil gas probes at BSL; however, based on the existing BSL groundwater and soil gas data, additional BSL characterization is not warranted at this time. ADEQ will re-evaluate should site conditions change.

With regards to Golder Associates' comment concerning ADEQ's temporary installation and sampling of shallow soil gas probes within the landfills to evaluate potential onsite exposure for trespassers: Exposure to soil gas occurs at the surface rather than within the waste itself. As such, the most effective evaluation of the risk of this exposure is through the collection of shallow soil

gas samples. For this reason, ADEQ focused on 5-foot sample depths.

2.10 Comment No. 10 – Reductive Dechlorination of Groundwater VOCs

Page 56, Section 5.2.3 – “In groundwater, reductive dechlorination is considered the primary mechanism of biodegradation.”

Evidence of biodegradation in the vadose zone was referenced in CDM (1998). It is likely that biodegradation processes or other means of natural contaminant reduction are occurring in groundwater during transport. However, based on the data provided in the GOU RI report (Stantec, 2012) and the draft LOU RI report (CCA, 2013), the VOCs in groundwater do not appear to be undergoing reductive dechlorination. The relative ratios of PCE and its daughter products have remained roughly the same, even as the PCE and other VOC concentrations have decreased in some of the groundwater wells. If reductive dechlorination was effectively reducing the PCE, the ratios of PCE and other VOCs should change over time. It is much more likely that the reductive dechlorination occurred under methanogenic conditions within the landfills or immediately under the landfills. The VOCs appear to have moved from the landfill and through the vadose zone to groundwater in roughly the same degree of biodegradation as is observed today in groundwater. The isotopic evidence of biodegradation and the deep carbon dioxide gas cited in the CDM report is more appropriately the result of degradation in the landfill, where methane and CO₂ are generated, and subsequent migration of landfill gas with high CO₂ concentrations. In order to evaluate potential remedial actions, additional sampling and analysis for evidence of reductive dechlorination in groundwater and/or the vadose zone should be performed (United States Environmental Protection Agency (USEPA) [2008] and Air Force Center for Environmental Excellence (AFCEE) [2004]).

ADEQ Response: Data provided in the GOU RI report does indicate a change in the ratios of PCE to its daughter products over time in some wells. For example, the ratio of PCE to cis-1,2 dichloroethene in wells WR-273A and WR-274 decreased from 30 to 4 and from 27 to 5, respectively from 2001 to 2011. As the referenced statement indicates, reductive dechlorination is considered to be the primary mechanism of biodegradation of PCE in groundwater, *to the extent that it does occur*. Further evaluation of biological processes occurring at the site may be conducted during the FS if deemed necessary for the evaluation of remedial alternatives.

2.11 Comment No. 11 – Section 5.0 Contaminant Fate and Transport

The data used to evaluate the potential for VOCs in the vadose zone to partition to groundwater under equilibrium (Henry’s Law) conditions are not very

useful. The distances between where the vadose zone samples were obtained and the groundwater table are too great to realistically evaluate the process. As stated at the end of Section 5.2.1, “VOCs are transported into the saturated zone at the capillary fringe, as COCs in soil gas partition into groundwater.” To effectively evaluate the potential for VOCs to move from the vadose zone to groundwater, vadose zone soil gas samples and groundwater samples need to be obtained very close to this interface at similar times. This has not occurred at the LOU, and the discussion in the draft RI report is highly speculative and inconclusive.

In addition to the comment above regarding the distance between vapor and groundwater samples, the potential amount of leakage during vadose zone soil gas sampling may have been greater than presented in the draft RI report and in Appendices C through F. Many of the deep soil gas and other soil gas samples exhibit standard atmospheric conditions, no methane, low carbon dioxide, and 21 percent oxygen. Typically, oxygen concentrations decrease with depth as the interaction between the atmosphere and the soil gas is reduced. Leak testing was performed at the sample train. However, the leak testing only evaluated potential leakage at the surface, not leakage of the probe casing or surface seal. The use of a shroud over the top of the probe with leak testing may be a more appropriate sampling method when evaluating vapor intrusion potential and sampling for parts per billion VOC concentrations.

ADEQ Response: The purpose of comparing VOC soil gas concentrations to groundwater concentrations at selected wells was not to evaluate the potential for VOCs to partition into the groundwater. Rather, these comparisons were made to evaluate whether non-equilibrium conditions exist. In fact, at BNL, where SVE operations depleted VOCs from the soil gas, mass transfer of VOCs would be expected to occur from the groundwater to the vadose zone under equilibrium conditions. ADEQ agrees that comparing VOCs in soil gas and groundwater within R-068A is not warranted given the significant distance between sampling points. This text has been removed from the final LOU RI report. However, it remains the opinion of ADEQ that the historical data at WR-273A provide evidence that non-equilibrium conditions likely exist in the subsurface.

The deep soil gas samples that appear to exhibit atmospheric conditions according to Table E1 (Appendix E) are from probes located at BNL. These elevated oxygen levels are likely the result of SVE/AI activities at the site. Soil-gas monitoring at BNL (Attachment E3.1, Appendix E) indicates oxygen levels in the deep vadose zone increased to near 21 percent during AI and have remained elevated after system shut down. Detected oxygen levels are therefore not likely the result of leakage of the probe casing or surface seal.

2.12 Comment No. 12 – Section 6.0 Conceptual Site Model

On page xiii of the Executive Summary and in Section 6.0, a conceptual site model is proposed that relies solely on vapor-phase advective transport. The LOU states “Advective transport of aqueous phase VOCs in infiltrating soil water is not considered a significant transport mechanism during either phase.” This statement is essentially repeated later in Section 5.2.1 on Page 55. There is no discussion about the potential for advective transport from infiltration along Pantano Wash. The main source of recharge to the Tucson Basin aquifer is infiltration of streamflow. The downward movement of infiltrating surface water in Pantano Wash could have carried VOCs in the vadose zone from below the eastern edge of the landfills to the water table. However, there is no indication that the vadose zone below the eastern boundary of the LOU or the Pantano Wash has been investigated to evaluate this transport mechanism.

ADEQ Response: The primary mechanism of mass transfer to the groundwater is recognized to be vapor transport. The rationale behind this is clearly laid out in sections 5.0 and 6.0 of the Final LOU RI Report and associated references. Large rain events may allow infiltrating water to contact refuse and contaminated soil gas. It is possible that this has temporarily increased groundwater concentrations in the past. However, given the significant depth to groundwater and because sizeable infiltration events occur infrequently in Tucson, detailed investigation of this transport mechanism is not warranted at this time. Furthermore, the effect is not significant enough to warrant concreting of the bottom of the Pantano Wash and the cost of installing impermeable caps on the BNL and BSL to remedy this transport mechanism. It should be noted that the magnitude of infiltration is already diminished by Pantano Wash bank protection installed by Pima County in the 1980s.

2.13 Comment No. 13 – Impacts of Historical Poned Water at the BNL

Appendix K of the draft RI report presents a report on the vertical and horizontal extent of refuse at the BNL (Stantec, 2012c). This report was originally presented as Appendix B of the GOU RI Report. A significant area of apparently ponded surface water is shown on the 1962 Historical Aerial Photograph on Figure B-13. This ponded area is not shown on the site conditions interpretation shown on Figure B-14, nor is the presence of surface water discussed in the text of the Stantec report or the draft RI report. A smaller area of ponded surface water is present on the 1964 Aerial Photograph (Figure B-15). This area of ponded water appears to overlie the only area of the BNL that is underlain by a shallow clay layer (see Cross Section A-A’ on Figure 4 of the draft RI report). This northern area of the BNL appears to have some of the highest landfill methane concentrations and the thickest amount of waste. The highest groundwater PCE concentration shown on

Figure 49 of the GOU RI is in well WR-274A (Stantec, 2012a). This well is located just west-southwest of the former ponded area. The significance of the former ponded area, the underlying clay layer, and the presence of higher methane concentrations in this part of the BNL, should be addressed in the draft RI report.

ADEQ Response: The area at BNL referenced by Golder Associates in the comment above was an area of active sand and gravel mining operations at the northern portion of BNL that was later landfilled, and is labeled as such on Figure 14. It is likely that water ponded on the clay layer after rainfall events during mining operations as the clay was exposed at the gravel pit base. ADEQ has observed no spatial correlation between levels of methane and this northern area of the landfill. While it is true that relatively higher methane concentrations do exist in wells in the northern part of BNL, elevated methane concentrations also exist at other locations, such as R-070A and R-073A. As stated in the Final (and Draft) LOU RI Report in Section 4.5, gas concentrations cannot be spatially correlated to the lithology. In other words, this clay layer does not appear to significantly influence landfill gas concentrations. Moreover, the groundwater well with the highest PCE concentration, well WR-274A, is not located directly downgradient of the former ponded area whereas well WR-273A is. The most recent groundwater sample from well WR-273A had a PCE concentration approximately 20 times lower than well WR-274A.

2.14 Comment No. 14 – Potential Sources

Page 44, Section 4.2 – “Commercial customers included Davis-Monthan Air Force Base and Hughes Aircraft Company.”

For the purposes of the draft RI report, it is inappropriate and misleading to identify specific alleged users of the landfills. Furthermore, as noted above the statement is based solely on unverifiable claims of the former solvent recycler that cannot be independently substantiated. ADEQ should remove these statements from the report, or reference the alleged customers in a more generic manner.

ADEQ Response: This text has been removed from the draft RI, however this information will be utilized during the Proposed Remedial Action Plan (PRAP) stage.

2.15 Comment No. 15 – Surface Water Hydrology

Pages 11-12, Section 2.6 – “Stantec (2012b) observed generally adequate drainage at BNL after heavy rainfall events. However, minor ponding was observed in the capped area and sinkholes were observed in the central portion of the BNL and within the northern landfilled areas of the BNL.”

The intent of this section is to present general information regarding surface water drainage patterns within the BNL and BSL boundaries. Statements made are based primarily on the review of Tucson Department of Transportation maps (available through the agency website), a hydrologic study published in 1985, and general observations in 2012. A major issue with both landfills is the condition of the cover material, the uneven grade, and presence of deep-rooted vegetation, all of which are factors that could lead to ponding and infiltration of precipitation and stormwater through the cover and into the underlying waste material. The influx of water into underlying waste materials could encourage methane production, which must be mitigated in some manner. The observed ponding and presence of sinkholes are symptoms of the lack of a properly engineered prescriptive cap over the landfills that will divert surface water away from the landfilled material. The statement of “generally adequate drainage” is vague and should be clarified. Any reference to a “cap” should be replaced with “cover” so as not to give the reader the mistaken impression that the landfills have an engineered cap designed to direct water away from the landfilled materials.

ADEQ Response: ADEQ agrees that the BNL, BSL, and dross waste soil cover should be referred to as “soil cover” instead of “cap,” and the Final LOU RI Report text has been revised accordingly.

2.16 Comment No. 16 – Changing BSL Boundaries

Page 3, Section 1.3 Site Background – “Gollob Park has not been included within the LOU boundary in past reports because of the previous unavailability of confirmatory borehole logs within Gollob Park. The LOU boundary has been revised for this RI, and a portion of Gollob Park is now included in the LOU at the southern end of the BSL.”

Further discussion of the expansion of the BSL boundary into the Gollob Park area is provided on page 34 in section 3.3.4. This expansion is presumably based on the presence of waste materials found during borings in Gollob Park in February 2013.

The presence of waste material alone is insufficient to include this area within the boundaries of BSL. The area extending all the way to 22nd Street was known for wildcat dumping and the material underlying Gollob Park may have been the result of a wildcat dumping event. What other evidence was found to indicate this area was part of BSL? Section 3 in Appendix F states that demolition debris was encountered. Historical Aerial Photographs show a large building complex immediately south of Gollob Park that was demolished prior to construction of housing in the area. Waste encountered could be demolition debris.

Attachment F3 in Appendix F referenced in this section contains a photograph of old newspaper waste with legible text. No dates from the newspaper materials were provided. We request that any information concerning dates of the newspapers be made available. The newspaper dates would help confirm dates of disposal and provide a better opportunity to determine if this area is possibly part of BSL.

ADEQ Response: The lines of evidence supporting the inclusion of the Gollob Park property as part of BSL are as follows:

1. Historical aerials indicate earth movement/grading occurred in the Gollob Park property area while the SD1PC lease agreement was in effect. In the 1958 aerial from URS March 5, 2004 report (referenced in the Draft LOU RI Report), the aforementioned parcel appears to be undeveloped-still in its natural state. In the 1960 aerial, much of the same parcel area appears to have been graded and some appears to have been excavated. Considering this waste was deposited during active landfilling operations (1960), it is more likely that the Gollob Park property was part of the landfill. Additionally, isopach maps (Figure 24) show 8 feet of waste buried in Gollob Park. [Note--Subsequent aerials from 1962, 1964, and 1973 show smooth grading and no vegetation or objects on the parcel area. The 1978 aerial shows that the parcel had been converted to a park (Gollob Park).]
2. 1960 newspaper was found within the buried debris. Parts of a newspaper from 1960 were found within the waste within one of the interior boreholes; a blow-up of the part of the newspaper article indicating the date will be added to Attachment F3 in Appendix F. The date of the article can be inferred from the article's reference to Clark Gable being 59 years old when the article was written; Clark Gable was born in 1901; thus the article/newspaper came out in 1960, which is within the SD1PC's lease time period. Trash, plastic bags, rubber, glass, wood, oily-smelling material, brick, cardboard were the categories of wastes found in these boreholes—more than construction and demolition waste.