ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Aquifer Protection Program (APP)

SUMMARY and RESPONSE
to
PUBLIC COMMENTS

Energy Fuels Resources (USA) Inc. (EFRI)

Pinyon Plain Mine

Permit # 100333
LTF # 84446

Public Comment Period: **June 23, 2021 to August 7, 2021**

Public Hearing: **August 9, 2021**

Prepared by:

Arizona Department of Environmental Quality (ADEQ)

Groundwater Protection Value Stream (GPVS)

April 28, 2022

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1.0 INTRODUCTION

1.1. SUMMARY

The Pinyon Plain Mine ("the Mine") is an underground uranium mine currently being developed by Energy Fuels Resources (USA) Inc. (EFRI), hereafter referred to as "the Permittee", in Coconino County, Arizona, on mining claims on U.S. Forest Service (USFS) land within the Tusayan Ranger District of the Kaibab National Forest. The Mine operation encompasses approximately 17 acres located 150 miles north of Phoenix, 45 miles north of the Town of Williams, and 6 miles south of the community of Tusayan.

This Individual APP Permit consolidates the existing General APP Permits, one Type 3.04 for the Non-Stormwater Impoundment and two Type 2.02 for the Development Rock Stockpile and the Intermediate Ore Stockpile, for the Mine. In addition to this Individual APP Permit, numerous existing groundwater protections are contained in the USFS-approved Plan of Operations, Record of Decision and Clean Closure Plan for the Mine.

1.2. PUBLIC NOTICE COMMENTS

The public comment period began on June 23, 2021 and ended August 9, 2021. The preliminary decision to issue an Individual APP Permit and the associated public hearing was published in the Arizona Daily Sun Newspaper on June 23, 2021. A public hearing was held virtually on August 9, 2021. This summary of public comments received and associated ADEQ responses is prepared in accordance with the Arizona Administrative Code (A.A.C.) R18-9-109.

Everyone who commented during the public comment period has the right to file an appeal and request a hearing on the final decision as an appealable agency action under A.R.S. § 41-1092.03 by filing a written Request for Hearing or Notice of Appeal within 30 days of issuance of the final decision. A Request for Hearing or Notice of Appeal is filed when it is received by ADEQ's Hearing Administrator as follows:

Hearing Administrator
Office of Administrative Counsel
Arizona Department of Environmental Quality
1110 W. Washington Street
Phoenix, AZ 85007

The Request for Hearing or Notice of Appeal shall identify the party, the party's address, the agency and the action being appealed and shall contain a concise statement of the reasons for the appeal. Upon proper filing of a Request for Hearing or Notice of Appeal, ADEQ will serve a Notice of Hearing on all parties to the appeal. If you file a timely Request for Hearing or Notice of Appeal you have a right to request an informal settlement conference with ADEQ under A.R.S. § 41-1092.06. This request must be made in writing no later than 20 days before a scheduled hearing and must be filed with the Hearing Administrator at the above address.

2.0 DESCRIPTION OF CHANGES TO THE INDIVIDUAL APP PERMIT

A number of typographic errors were corrected and clarifying language edits made in the amended Individual APP Permit that are not reviewed in detail here. Substantive changes to the Individual APP Permit include:

1. *Section 2.1 Facility / Site Description:* Language updated to include "Groundwater harvested from the mine shaft for dust control may be used if treated using a water treatment system, which is designed to a treatment standard of to 0.05 mg/l for arsenic and to 0.03 mg/l for uranium."

2. *Section 2.1.1 Operational Limitations*
    a. Mining shall not occur above 5340 feet above mean sea level and below 4508 feet above mean sea level.
    b. Groundwater harvested from the mine shaft for on-site dust control may be used if treated using a water treatment system, which is designed to treat 0.05 mg/l for arsenic and to 0.03 mg/l for uranium.
3. *Section 2.1.3 Financial Capability:* The estimated dollar amount for facility closure and post-closure was updated to $1,539,816.
4. *Section 2.3 Discharge Limitations:* Removed language "Liner failure in a single-lined impoundment is any condition that would result in leakage exceeding 550 gallons per day per acre."
5. *Section 2.4 Point of Compliance:* Table 2: Points of Compliance (POC) updated to include the three Coconino Aquifer Wells as POC wells. Language updated to include, "Once ambient groundwater flow direction in the Coconino Aquifer is determined, which may not occur until after mining activities have ceased, the Permittee may submit an application to amend the APP Permit to designate one of the three Coconino POC Wells as the downgradient POC Well and the other two wells as non-POC monitoring wells" and "the Director may amend this permit to designate additional POCs and/or monitoring parameters, if information on groundwater gradients or groundwater usage indicates the need."
6. *Section 2*.5.3.7 *Coconino Groundwater Monitoring Wells*: Section deleted because the three Coconino wells were added as POC wells in Section 2.4: Point of Compliance.
7. *Section 2.9.1 Closure Plan:* Language updated to include, "The Mine currently has in place a Clean Closure Plan, which has been approved by the USFS under the Mine's approved Plan of Operations, which has formed the basis of the surety for the Mine, and which ADEQ has reviewed. Within 90 days following notification of closure, the Permittee shall submit for approval to the Groundwater Protection Value Stream, an updated closure plan which meets the requirements of A.R.S. § 49-252 and A.A.C. R18-9-A209(B)(3), which may be the existing Clean Closure Plan with any amendments or additions thereto that may be needed to ensure that those requirements are satisfied at the time of submission. The updated closure plan shall provide an estimate of the material removed from the ore body using 3-D mapping where accessible which shall include plan and cross-sectional views showing the void spaces and geologic structures in place in the ore body. The updated closure plan shall include an evaluation of the mapping results as it relates to stability. The updated closure plan shall provide a summary of the primary sources and amount of water pumped from the mine workings as a monthly average and the water quality of the water pumped from the mine sump to the lined Non-Stormwater Impoundment using the information collected pursuant to the routine discharge monitoring requirements for the mine sump in the Individual APP Permit Section 2.5.1.1 and Section 4.2, Table 7: Routine Discharge Monitoring.

    Regardless of whether the updated closure plan achieves clean-closure immediately, the Permittee shall continue to conduct post-closure groundwater monitoring and reporting at the POCs, including SMRF submittals for a period of 30 years in accordance with the conditions of the permit. If the closure plan contains a schedule for bringing the facility to a clean-closure configuration at a future date, ADEQ may incorporate any part of the schedule as an amendment to this permit."

8. *Section 2.9.2 Closure Completion:* Language updated to include "Upon completion of closure activities, the Permittee shall give written notice to the Groundwater Protection Value Stream indicating that the approved closure plan has been implemented fully and providing supporting documentation to demonstrate that clean-closure has been achieved (soil sample results, verification sampling results, groundwater data, as applicable). Regardless of whether clean-closure has been achieved, the Permittee shall continue to conduct post-closure compliance groundwater monitoring and reporting at the POCs, including SMRF submittals, as outlined in the Individual APP Permit Section 2.9.1. If any of the following conditions apply, the Permittee shall follow any additional terms of post-closure stated in this permit:

    1. Clean-closure cannot be achieved at the time of closure notification or within one year under a diligent schedule of closure actions;
    2. Further action is necessary to keep the facility in compliance with the AWQS at the applicable POC or, for any pollutant for which the AWQS was exceeded at the time this permit was issued, further action is necessary to prevent the facility from further degrading the aquifer at the applicable POC with respect to that pollutant;
    3. Remedial, mitigative or corrective actions or controls are necessary to comply with A.R.S. § 49-201(30) and Title 49, Chapter 2, Article 3;
    4. Further action is necessary to meet property use restrictions."

9. *Section 2.10 Post-Closure*: Language updated to include: "Post-closure requirements shall be established based on a review of facility closure actions and will be subject to review and approval by the Groundwater Protection Value Stream but consistent with the Individual APP Permit Section 2.9.1 shall include at a minimum a requirement to conduct post-closure groundwater monitoring and reporting at the POCs, including SMRF submittals, for a period of 30 years in accordance with the conditions of the permit.

    The Permittee shall submit for approval to the Groundwater Protection Value Stream a 30-year post-closure plan that addresses post-closure maintenance and monitoring actions at the facility. The post-closure plan shall meet all requirements of A.R.S. § 49-201(36) and 49-252 and A.A.C. R18-9-A209(C). Upon approval of the post-closure plan, this permit shall be amended or a new permit shall be issued to incorporate all post-closure controls and monitoring activities of the post-closure plan."

10. *Section 3.0 Compliance Schedule, Table 5*: *Compliance Schedule Items*:

    Deletion of Draft Permit CSI No. 4: "Begin ambient groundwater monitoring in POC for Redwall-Muav aquifer and monitoring wells for ten (10) quarters, as required under Section 4.2, Table 8: AMBIENT GROUNDWATER MONITORING."

    Addition of Final Individual APP Permit CSI No. 4: "The permittee shall submit an APP Permit "Minor" amendment application which includes an ambient groundwater monitoring report to establish (Alert Levels (ALs) and Aquifer Quality Limits (AQLs) for POC #4 (Redwall-Muav aquifer). At a minimum the report shall contain analysis of background sampling data, statistical approach to setting an AL and AQL for arsenic and an AQL for uranium, copies of all ADWR documents related to the wells, as-built diagrams of wells, and latitude and longitude of each well. The report shall be sealed by an Arizona Registered Geologist or other qualified registrant. Due within 90 days following permit issuance"

Adjustment to Language in Final Individual APP Permit CSI No. 5: "The permittee shall submit an APP Permit "Minor" amendment application which includes an ambient groundwater monitoring report to establish ALs and AQLs for the selected POCs for the perched Coconino aquifer and any remaining parameters for the Redwall-Muav aquifer where limits have not been previously established. At a minimum the report shall contain analysis of background sampling data, statistical approach to setting ALs and AQLs, copies of all ADWR documents related to the wells, as-built diagrams of wells, and latitude and longitude of each well. The report shall be sealed by an Arizona Registered Geologist or other qualified registrant. Due within 90 days of completion of ambient groundwater monitoring under Section 4.2, Table 8: AMBIENT GROUNDWATER MONITORING."

Deletion of Draft Permit CSI No. 6: "Delay mining within the breccia pipe at the Coconino level until background water quality is established by the three wells that were installed within the Coconino Formation."

Addition of Final Individual APP Permit CSI No. 11: "Permittee shall submit a supplemental financial assurance mechanism to include updated post-closure costs of $132,581. Due within 180 days following permit issuance."

11. *Section 4.2:*

Table 9 Compliance Groundwater Monitoring: Addition of the three Coconino Aquifer Wells as POC wells.

Table 10: Facility Inspectional and Operational Monitoring: Added Dust Control Operational Requirement to maintain records of water treatment system maintenance on a monthly inspection frequency.

Draft Permit Table 11 Groundwater Monitoring: Table removed because the three Coconino Aquifer Wells were added as POC wells in Table 9.

3.0 RESPONSES TO COMMENTS

Comments received during the public comment period are summarized below. The comments are followed by ADEQ's response shown in italics.

Comments may have been shortened or paraphrased for presentation in this document; a copy of the unabridged comments is available upon written request from the ADEQ Records Center, recordscenter@azdeq.gov.

Written comments received on the official record were received during the formal Public Comment period and verbal comments received on the official record were received during the Public Hearing.

3.1. PHYSICAL AND BIOLOGICAL ISSUES

3.1.1. GEOLOGY AND HYDROGEOLOGY

ADEQ received comments regarding a number of geological, hydrogeological, geochemical, and water quality concerns for the draft Individual APP Permit. The general topic categories are:

1. Water Balance
2. Groundwater Divide

3. Groundwater Movement
4. Groundwater Quantity
5. Groundwater Quality
6. Groundwater Monitoring

The following six sections address these topics in this order.

3.1.1.1. WATER BALANCE

NEED FOR HYDROGEOLOGIC FRAMEWORK MODEL (HFM)

Commenters stated a concern that there is not a basic water balance or hydrogeologic framework established for the project. Comments suggested that a "Hydrogeologic Framework Model," or HFM, should be developed. An HFM would have a number of components describing the geologic units, formations, geologic structure, and other geologic properties derived from available mapping and publications. An HFM, as described in the comments, would identify the aquifers that exist at the Mine and the basic properties of those aquifers including transmissivity, storage, and yield. Comments suggested that various numerical methods are available to define the surfaces of hydrologic units and the stratigraphic and structural relationships. The comments emphasized that an HFM is not a predictive numerical model but a fundamental quantitative first step. The comments also suggested that an HFM could be used to support a numerical groundwater model to further understand flow at a regional level.

ADEQ Response

The elements and output of the HFM as proposed in the comments, have been developed and are well understood. "HFM" is one term for such a model, and ADEQ utilizes the term Conceptual Site Model ("CSM"), which is functionally the same as the HFM discussed in the comments. From the geologic and hydraulic observations in the shaft, plus the logging of the monitoring wells and exploration boreholes, the stratigraphy of the Mine is well defined, as is the thickness and character of the water bearing zones. The various numerical methods suggested in the comments for discerning geologic structure can be valuable tools: however, in this case, there is direct geological observation of the structure and saturation of the aquifer units.

One commenter expressed that ADEQ's analysis was insufficient to properly identify the aquifers that exist at the Mine and the basic properties of those aquifers including transmissivity, storage, and yield. ADEQ has reviewed measured data at the USGS monitoring well in the Coconino aquifer (C-aquifer). The monitoring well water levels surrounding the shaft allow calculation of the aquifer storage and the shaft pumping gives the yield. Water levels at the nearby USGS monitoring well have exhibited both increases and decreases while the shaft is being pumped. Based on a conservative review of the data to date, the C-aquifer has declined by a maximum of 4-5 feet since pumping the shaft began, (based on the USGS monitoring well water levels), which is approximately 2-3% of the C-aquifer thickness. These data suggest the USGS well, located just off-site, helps define the cone of influence of the shaft (and thus the transmissivity).

Since 2020, water levels appear to be stabilizing, suggesting the shaft pumping is nearing equilibrium with the C-aquifer. ADEQ notes that, qualitatively, a fully-penetrating well in the C-aquifer producing 19 gallons per minute (gpm) would be considered a low yield. As these data show, ADEQ has demonstrated an understanding of the aquifer that goes beyond the basics of an HFM described in the comments and is monitoring the aquifer response.

The pumping of the shaft comprises a multi-year, quantitative pumping test of the C-aquifer. Ongoing monitoring of drawdown over time will continue to refine the understanding of these properties. These measurements together provide an ongoing measurement of the water balance at the Mine (one purpose of the HFM) both for the current conditions and as the Mine is developed. Continued monitoring will refine the understanding. Numerical modeling is not needed at this time given the ongoing direct and continuous measurement of aquifer hydraulic properties and responses. Regional numerical modeling was completed by the USGS and was considered in the ADEQ evaluation of the Individual APP application. This modeling includes the CARAMP[1] flow model (based on the USGS NARGFM[2]) which ADEQ considered in its evaluation of the application and Individual APP Permit. This model predicted groundwater heads out to 100 years, which is the practical limit of what current models, and the underlying data, can support. The NARGFM report includes a "hydrogeologic framework and a conceptual groundwater-flow model". ADEQ will continue to monitor regional work by USGS and others, as this area is actively being studied. Additional discussion of the modeling and related comments are presented under other comment topics.

ADEQ's CSM provides the understanding of the water balance and the elements of the water balance concerns raised in these comments. The CSM functionally addresses all the relevant features of an HFM.

3.1.1.2. GROUNDWATER DIVIDE

ROLE OF REGIONAL STRATIGRAPHIC TILT

Commenters expressed concerns about horizontal movement of groundwater from the Mine. Commenters asserted that the permit application and draft permit rely on an unsupported assumption that because the stratigraphic tilt (tilted rock layers) is to the southwest, the groundwater flow is also to the southwest.

Commenters stated that a "hypothetical" barrier from the stratigraphic tilt, which the application and draft permit rely on, is likely inferred from an anticlinal[3] feature mapped north of Mine, but has not been confirmed with coring or geophysics. Moreover, the comment asserts that this assumption does not factor in the consideration that an anticlinal fold is usually associated with extensive fracturing due to tectonic pressures, which, if present, would be incompatible with any anticlinal feature or postulated groundwater divide being assigned status as an impenetrable barrier to horizontal groundwater flow."

[1] Matrix New World Engineering, Southwest Groundwater, 2020. *Coconino And Redwall-Muav Aquifer Modeling Project (CARAMP), Northern Arizona*, Prepared for Coconino Plateau Watershed Partnership, Matrix Project No.: 19-493, 72 p., February, sealed by William Greenslade, PE, RG (AZ PE NO. 10313)

http://www.cpwac.org/generalfiles/C%20R%20Aquifer%20Modeling%20Final%20Report.pdf

[2] Pool, D.R., Blasch, K.W., Callegary, J.B., Leake, S.A., and Graser, L.F., 2011, Regional groundwater-flow model of the Redwall-Muav, Coconino, and alluvial basin aquifer systems of northern and central Arizona: U.S. Geological Survey Scientific Investigations Report 2010-5180, v. 1.1, 101 p., Northern Arizona Regional Groundwater Flow Model (NARGFM). https://pubs.usgs.gov/sir/2010/5180/

[3]An anticline is a structural geologic feature formed by the folding of rock strata into an arch-like shape. The rock layers in an anticline were originally laid down horizontally and then earth movement caused it to fold into an arch-like shape called an anticline.

In short, comments stated that the idea in the permit application of a stratigraphic tilt outweighing the major influence of groundwater inputs (sources) and outflows (sinks), is unsupported by any rigorous field measures of subsurface hydraulic parameters near the "hypothetical groundwater divide."

ROLE OF AIRPORT GRABEN AND VISHNU FAULT

Commenters further asserted that this assumption does not account for the documented monocline[4] near the Mine, which tilts in several directions, including toward the Airport Graben, and the Vishnu fault was not considered, yet these faults "are recognized to transport groundwater northward to the Grand Canyon." Thus, even if groundwater hypothetically moved southwest from the Mine, it would still encounter the Grand Canyon through the upper reaches of Cataract (Havasu) Canyon.

ADEQ Response

Role of Regional Stratigraphic Tilt

ADEQ relied on multiple lines of evidence in evaluating the role of stratigraphic tilt. ADEQ concurs with the following hydrogeologic report conclusions:

- *The groundwater divide present between the Mine and the Grand Canyon acts as hydrogeologic control and provides an element of natural protection by preventing direct northward migration of groundwater.*
- *Hydrogeologic principles that control groundwater flow dictate that the southwesterly regional dip of the layered geologic section directs groundwater flow away from the portion of the Grand Canyon located a distance of approximately 12 miles north of the Mine.*
- *Dr. Errol Montgomery, of Montgomery and Associates (ELMA), concluded based on his investigations that no principal structural features were present within the project area.*[5,6]

Uncertainties in regional structural geology and its effect on flow are recognized in ADEQ's review of the Individual APP application. These regional scale questions are addressed by required, ongoing, site-specific monitoring. Importantly, during operation of pumping of the shaft, the groundwater flow gradient is radially inward toward the Mine and serves as a robust, long-term pumping test of the aquifer system. Monitoring the response of the system over the life of the project and after dewatering stops will provide data necessary to confirm or refine the regional flow direction.

Structural dip is only part of the evidence supporting the evaluation of groundwater flow direction. Regional groundwater levels, peer-reviewed modeling and geologic structure

[4] A monocline is a step-like fold in rock strata consisting of a zone of steeper dip within an otherwise horizontal or gently-dipping sequence.

[5] Earl L. Montgomery and Associates, Inc. (ELMA), 1993. Final report; Aquifer Protection Permit Application, Energy Fuels Nuclear, Inc., Canyon Mine, Coconino County, Arizona, December 1993.

[6] Carlock, George Read and Michael J. Brophy; Ryley, Carlock and Applewhite, 1992. Responding Brief of Energy Fuels Nuclear, Inc. Docket no. D-19-88. November 16, 1992. [Includes Dr. Errol Montgomery testimony. The testimony is summarized in the Responding Brief of EFN provided in Appendix A of the Application.]

mapping[7] form the basis for this evaluation. These comments mischaracterize ADEQ's analysis of the flow regime. ADEQ's analysis is supported by the USGS mapping[8] that suggests an inferred groundwater divide and stratigraphic dip between the Mine and the south rim of the Grand Canyon, which together indicate that groundwater flow is to the south.

USGS modeling[9] of the Coconino Plateau[10] and subsequent models[11] built upon it, suggest a general southerly groundwater flow direction from a groundwater mound at Tusayan to the Mine away from the Grand Canyon. The directional gradients as seen in the contour mapping show the potential horizontal groundwater flow paths from the Mine towards the southwest suggest the groundwater flow may eventually encounter the Grand Canyon. If extrapolated beyond the USGS[12] contour mapping data, following a conceptual flow path through the upper reaches of Cataract (Havasu) Canyon, there is a significant flow path distance of approximately 40-50 miles from the Mine and toward Havasupai tribal lands. At this distance from the Mine it is extremely unlikely that the mining activities could impact water quality. The Individual APP Permit requires that groundwater quality standards are met at the POC monitoring wells located on-site. In the event any groundwater standard is exceeded at a POC well, mitigation measures will be implemented to stop any migration of pollutants.

Role of Airport Graben and Vishnu Fault

ADEQ recognizes the potential for vertical connectivity between aquifers along the faults and features mentioned in this comment (Vishnu Fault, and Airport Graben) and the potential for eventual flow into the Grand Canyon, but these structures are 2 or more miles from the Mine.

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[7] Billingsley, George H., Felger, Tracey J., and Priest, Susan S., 2006. Geologic Map of the Valle 30' x 60' Quadrangle, Coconino County, Northern Arizona, 23 p., 1 map plate.

[8] Bills, D.J., Flynn, M.E., and Monroe, S.A., 2007, Hydrogeology of the Coconino Plateau and adjacent areas, Coconino and Yavapai Counties, Arizona (ver. 1.1, March 2016): U.S. Geological Survey Scientific Investigations Report 2005– 5222, 101 p., 4 plates, http://dx.doi.org/10.3133/sir20055222.

See cross-section A-A' on Plate 1 entitled: Surface Geology, Geologic Structure and Sections of The Coconino Plateau and Adjacent Areas, Coconino and Yavapai Counties, Arizona.

See potentiometric surface map on Plate 4 entitled: Water-Chemistry, Tritium, And Carbon-Age Data for Selected Wells And Springs That Issue From The C Aquifer And Redwall-Muav Aquifer And For Selected Surface-Water Sites, Coconino Plateau And Adjacent Areas, Coconino And Yavapai Counties, Arizona.

[9] Pool, D.R., Blasch, K.W., Callegary, J.B., Leake, S.A., and Graser, L.F., 2011, Regional groundwater-flow model of the Redwall-Muav, Coconino, and alluvial basin aquifer systems of northern and central Arizona: U.S. Geological Survey Scientific Investigations Report 2010-5180, v. 1.1, 101 p., Northern Arizona Regional Groundwater Flow Model (NARGFM). https://pubs.usgs.gov/sir/2010/5180/

[10]Southwest Ground-water Consultants, Inc., 2015. Red Gap Ranch – Leupp Water Resources Environmental Assessment Groundwater Flow Model (RGRLGFM), Prepared for City of Flagstaff Utilities Division, SGWC Job No. B1985, December. 30 p., sealed by William Greenslade, PE, RG (AZ PE NO. 10313)
http://www.cpwac.org/generalfiles/RGRL%20Groundwater%20Flow%20Model.pdf

[11] Matrix New World Engineering, Southwest Groundwater, 2020. Coconino And Redwall-Muav Aquifer Modeling Project (CARAMP), Northern Arizona, Prepared for Coconino Plateau Watershed Partnership, Matrix Project No.: 19-493, 72 p., February, sealed by William Greenslade, PE, RG (AZ PE NO. 10313)
http://www.cpwac.org/generalfiles/C%20R%20Aquifer%20Modeling%20Final%20Report.pdf

[12] Bills, et al., 2007.

USGS geophysical evaluation and mapping[13] suggest no significant geologic structure adjacent to the breccia pipe or the hydraulic influence of the shaft. Movement of groundwater and, more importantly, any potential contamination, will be identified at the POC and corrected before any potential contamination can reach these features.

The hydrogeologic report in the Individual APP application summarizes ELMA findings, which remain valid and consistent with USGS findings. The report includes excerpts from the ELMA report:

> *"Structural analyses for the project area and the … Mine site included three levels of investigation: analyses of aerial photographs; inspection of the project area from the air during overflights; and field investigations including observations made on foot and in vehicles, analysis of geologic and geophysical logs for exploration boreholes and for the … Mine water supply/monitor well, and analysis of results from pumping tests for the … Mine well. Results of these investigations indicate that the … Mine site is located about 2 miles from any fracture zones capable of transmitting groundwater downward through confining units (Huntoon, in May Pascoe Davis & Associates, 1991, p. 131) and that principal structural features are not present in the project area."*

3.1.1.3. GROUNDWATER MOVEMENT

VERTICAL GROUNDWATER MOVEMENT

Comments and ADEQ responses related to vertical groundwater movement are addressed in the following subsections.

VERTICAL FRACTURES ASSOCIATED WITH BRECCIA PIPES (PRE-EXISTING)

A number of commenters expressed concern that vertical fractures associated with the breccia pipe, and the local rock structure in general, present pathways for groundwater leakage to the Redwall-Muav aquifer (R-aquifer). Comments cited observations of unhealed fractures and faults, some at a high angle (i.e., near vertical), in exploratory boreholes. Commenters noted that fractures were observed in boreholes as deep as 2,200 feet below surface. Commenters proposed the use of seismic tomography as a tool to further delineate the geologic structure of the Mine.

Commenters discussed how the breccia pipes in the Grand Canyon area generally formed as collapse features in the bedrock, which were later filled with secondary mineralization. The collapsed area that formed the breccia pipes is subsequently surrounded by a series of near vertical ring fractures in the broken transition area to the surrounding flat-lying rock. One commenter noted that there are other breccia pipes in the region which have not been characterized. Overall, the commenters stated that the draft permit does not account for vertical flow at the Mine and relies on an inaccurate conclusion that the bedrock under the ore zone and above the R-aquifer is impermeable.

[13] Gettings, Mark E. and Bultman, Mark W., 2005. Candidate-Penetrative-Fracture Mapping of the Grand Canyon Area, Arizona, from Spatial Correlation of Deep Geophysical Features and Surficial Lineaments, U.S. Geological Survey Data Series 121, 26 p., poster, presentation, and 8 Plates. https://pubs.usgs.gov/ds/121/

A related comment noted that in situ leaching is not used at breccia pipe mines because of concerns about leakage to the aquifer. While not fully explained in the comment, the assumption appears to be that this may apply to potential vertical leakage to the R-aquifer.

ADEQ Response

The geology of breccia pipes in the region is well understood to be a source of dissolved uranium to groundwater and springs in the region of the Grand Canyon[14]. The uranium was deposited by the movement and dissolution of uranium minerals by groundwater over geologic time. Potential migration of groundwater along the ring fractures associated with breccia pipes from the mineralized zones to deeper horizons is a natural process that has contributed to the overall background concentrations of uranium across the region. In the specific case of the Mine, this geologic understanding is the basis for requiring characterization and monitoring during Mine development and operation.

ADEQ recognizes that there are aquifers within the region, including the South Rim of the Grand Canyon, which may be susceptible to pollution from surface sources. Tracer testing of karst features north of the Grand Canyon, noted in some comments, shows this concern is valid. ADEQ agrees with the need to continue research of the regional groundwater systems, and is therefore requiring controls, monitoring, and characterization of the site-specific conditions, and not limiting evaluation to the CSM, submittals from the Permittee, or regional groundwater models to demonstrate compliance.

Commenters were concerned with the presence of high angle fractures observed in exploration boreholes as potential conduits for flow. Fractures do exist in the formation and it is not possible to trace every feature. However, the overall hydrology and geology does not suggest these features are continuous or, en masse, create enough flow to create a release that will impact groundwater above the standards. The fact that the R-aquifer is presently not impacted above standards shows that the millennia of potential leakage through the breccia pipe, associate ring fractures, and other features has not caused an exceedance of water quality standards in the R-aquifer. The Individual APP Permit includes a monitoring program designed to detect if an unlikely release does occur by utilizing monitoring wells in both the C-aquifer and R-aquifer.

One comment noted that in situ leaching is not used at breccia pipe mines because of concerns about leakage to the aquifer. In situ leaching, by design, increases permeability of the rock using acid or another solute to remove minerals for recovery. This method could greatly increase local permeability and allow migration in a variety of geologic settings. This method is not under consideration at the Mine. The choice of mining methods is a highly site-specific decision, made by the Permittee, based on a number of economic, engineering, and environmental considerations. At this Mine, the data suggest that vertical leakage is not likely because there is a thick, competent aquitard with 1,580 feet of head difference between the formations.

USE OF TOMOGRAPHY TO MAP FRACTURES

Commenters suggested that tomography, a 3-D exploration method using seismic methods to discern fracture and other structure architecture in the subsurface, should be used to define the geologic structure at the Mine. Commenters suggested this tool should have been used in existing coreholes to

[14] Alpine, Andrea E., ed., 2010, Hydrological, geological, and biological site characterization of breccia pipe uranium deposits in northern Arizona: U.S. Geological Survey Scientific Investigations Report 2010–5025, 353 p., 1 pl., scale 1:375,000. https://pubs.usgs.gov/sir/2010/5025/

map orientation, aperture, and length of fractures and that tomography would be helpful in assessing the permeability of the aquitard.

ADEQ Response

Tomography, a broad term for various tools most commonly used in oil exploration, would not be practical or particularly illuminating for this Mine. The seismic properties of rock types are likely very similar to each other and tomography relies on a contrast between the seismic velocities, which would not provide the resolution the comments suggest for small-scale features of interest. The geology is well understood because of the density of data from logs of wells and exploratory boreholes. EFRI and its predecessors completed a total of 150 holes (45-surface and 105-underground) totaling 92,724 linear feet from 1978 to 2017.[15][16] *In addition to the data from exploratory boreholes, boreholes for five wells, and the production shaft were logged in detail and the geology defined at a level beyond what tomography could achieve, and most importantly sufficient to scope the control and monitoring program. Critically, tomography is used to define structure (when correlated with boreholes) and is not a quantitative tool for measuring hydraulic properties of an aquifer or aquitard.*

Geologic and hydrogeologic studies referenced in the Individual APP application have shown no evidence of macro-scale features (e.g., karst) creating significant downward drainage at the Mine. Tomography would not be useful in mapping the small-scale fractures and geologic details suggested in the comments and would not yield quantitative information on permeability of groundwater flow. In contrast, the groundwater monitoring system and shaft itself allow for direct measurement and observation of the geology, the saturated aquifers, and the aquitard. Monitoring groundwater levels accurately defines the gradient and flow direction and shaft pumping defines the aquifer yield.

POST MINING COLLAPSE FRACTURING

In addition to historical and present-day fracturing, commenters expressed concern that the cavities created and the potential for collapse after Mine closure may enhance fracturing and create or enhance the potential for vertical flow.

ADEQ Response

ADEQ finds that the probability of post-closure collapse of the production voids left by mining is remote because of the mining methods that leave pillars in place and rock strength. Refer to the Mine Subsidence section for further details. However, to address the concern that the cavities created and the potential for collapse after Mine closure may enhance fracturing and create or enhance the potential for vertical flow, ADEQ is requiring a 30-year post-closure monitoring period. For additional information on this matter refer to the Description of Draft Changes to the Permit section of this Responsiveness Summary.

[15] Roscoe Postle Associates Inc. (RPA), 2017. Technical Report on the Canyon Mine, Coconino County, Arizona, USA. Prepared for Energy Fuels Resources (USA) Inc. NI 43-101 Report. Qualified Persons: Mark B. Mathisen, C.P.G., Valerie Wilson, M.Sc., P.Geo., Jeffrey L. Woods, QPMMSA, SME, Page 10-1,

[16]Table 1 "Records for Mineral Exploration Boreholes, Pinyon Plain Project Area", Hydrogeologic Report, individual APP permit application Volume II, Appendix A.

DOWNWARD VERTICAL GRADIENT

Comments noted the presence of a vertical downward hydraulic gradient between the C-aquifer and the underlying R-aquifer and believe that this is evidence of groundwater flow downward to the R-aquifer. In related comments, it was discussed that the C-aquifer discharges into the R-aquifer on a regional scale along the South Rim, as discussed in a variety of literature sources. Several commenters took issue with the characterization of the aquitard separating the R-aquifer and the C-aquifer as "impermeable".

ADEQ Response

The presence of a downward vertical gradient from the C-aquifer to the R-aquifer does not establish vertical flow. The vertical gradient, by definition, is simply the head difference between the C-aquifer and R-aquifer divided by the thickness of the intervening formations. In other words, it is simply a potential, (roughly analogous to the pressure) and by itself does not mean there is flow. For flow to occur, both a vertical gradient and a permeable formation are needed. The amount of flow is a function proportional to both the gradient and the permeability of the rock formations.

The vertical gradient is more accurately evidence of the hydraulic separation of the aquifers. The large head difference between the R- and C-aquifers of 1,580 feet shows the intervening material is low enough permeability to support the existence of the water table in the C-aquifer. A low permeability aquitard would allow the C-aquifer to drain and not remain saturated. The C-aquifer is thus perched on the underlying aquitard and is not draining into the R-aquifer at the Mine at a rate that would create a contamination concern. Moreover, measurements of the R-aquifer level indicate over 300 feet of artesian head pressure[17], further demonstrating the presence and competence of the low permeability formation overlying it.

The low permeability (resistance to flow) of the geologic material between the C-aquifer and R-aquifer is quantitatively supported by hydraulic conductivity testing of these materials. Laboratory test results on core samples[18] from the exploration drill holes show that hydraulic conductivity of the intervening geologic units ranges from a maximum of 6.18 x10-7 cm/sec in the Upper Supai, to consistently below 1 x10-8 cm/sec in Lower Supai and Redwall. For comparison purposes, the hydraulic conductivity of a typical geosynthetic clay liner used in a landfill ranges from 1x10−9 to 1x10−7 cm/sec. The measured hydraulic conductivity of the intervening geologic units is on the order of a geosynthetic clay liner system and is hundreds of feet thick.

The various regional studies cited in the comments are part of the overall CSM ADEQ developed for the Mine. Observations and measurements at the Mine demonstrate that the R-aquifer and C-aquifer are separated at the Mine by a significant layer of low permeability material and a significant head difference of approximately 1,580 feet. ADEQ understands that no formation is 100 percent impermeable and site-specific data and ongoing monitoring are needed to demonstrate the hydraulic separation of the C-aquifer and deeper R-aquifer.

[17] Artesian pressure means water pressure in an aquifer sufficient enough to cause the groundwater level in a well to rise above the level at which it was encountered in the well whether or not the water flows at the ground surface. Artesian pressure means groundwater under sufficient hydrostatic head to rise above the rock unit containing the aquifer. Source: https://www.lawinsider.com/dictionary/artesian-pressure

[18] Table 2, Summary of Results for Laboratory Core Permeability Tests, Pinyon Plain Mine Site, Pinyon Plain Hydrogeologic Report, Kaibab National Forest, Coconino County, Arizona.

Many commenters suggested that ADEQ considers the formations below the C-aquifer perfectly impermeable based on a superficial reading of the permit and supporting documents. As discussed previously, no rock formation is 100 percent impermeable as is recognized in hydrogeological literature. The correct term for the formations between the C-aquifer and R-aquifer is "aquitard" and ADEQ has reviewed the data as to the competence of the aquitard as it relates to the risk of contamination leakage.

The data show the aquitard is sufficiently low permeability and thick enough to create confined conditions in the R-aquifer and a head difference of 1,580 feet between the R-aquifer and the C-aquifer. Age differences between the C-aquifer and R-aquifer and geologic observations in boreholes further support this conclusion. If other features such as the ring fractures were historically or currently active flow conduits to the R-aquifer, groundwater quality samples would show impact in the R-aquifer monitoring well. These observed conditions at the Mine provide a high degree of scientific certainty that the R-aquifer is protected at the Mine. However, ADEQ is requiring controls and monitoring of the R-aquifer to identify potential leakage.

EXPLORATION BOREHOLES

Commenters expressed concern that the exploration boreholes completed by the Permittee are not sealed and are potential conduits for vertical flow to deeper aquifers.

ADEQ Response

The exploration boreholes were completed and closed according to the applicable rules at the time they were drilled. The Individual APP Permit does not regulate exploration boreholes as they are not considered discharging sources. However, any potential impact of these boreholes will be captured by the groundwater monitoring program. The fact that many of the boreholes were completed decades ago suggests that the historical boreholes are not causing impacts to the aquifers.

INFILTRATION FROM LAND SURFACE AND RECHARGE AREA

Commenters discussed infiltration from land surface to the C-aquifer (the vadose zone) and stated that the permeability, primary and secondary porosity, and dispersivity of the overlying soil and bedrock (Moenkopi Formation or Moenkopi) has not been characterized adequately to conclude surface infiltration is not an issue for carrying dissolved contaminants to groundwater. Commenters asserted that there are high levels of surface water recharge, greater than at the Mine, based on the presence of topographic depressions associated with breccia pipes (in general). Some suggested that features such as alluvial channels may create downward pathways for precipitation.

Commenters discussed the size of the potential recharge area contributing to the Mine area and suggested the past estimates underestimate the area and amount of recharge and that current data would benefit a more current understanding.

ADEQ Response

The characteristics of the vadose zone (including the Moenkopi) have been characterized based on textural classification and observation by qualified geologists. Exploration boreholes and the new monitoring well borings at the Mine defined the thickness and geology of the unsaturated zone, including the Moenkopi. This level of characterization is appropriate for the Individual APP Permit needs because it shows that the C-aquifer is protected from ground surface releases by the 900ft thick vadose zone above the C-aquifer. This thick vadose zone affords a high level of

protection to the aquifer from any surface contamination. These processes are well understood and the large thickness of the vadose zone compensates for any uncertainty. The Mine life is finite and since any surface soil contamination will be addressed at closure, surface contamination will not be left in place as a source of potential leaching into the vadose zone.

There are no springs, sinkholes, closed depressions, buried alluvial channels, or other karst features on site, as evidenced by exploratory boreholes, aerial photography, logging of the shaft, and topography. These tools of exploration and evaluation are the standard geologic approach for determining if a karst system, buried alluvial channels, or preferential flow features exist. The Mine occupies a shallow topographic drainage feature with storm water flow entering and exiting the area outside the Mine berm. The Mine is bermed and separated from the local alluvial drainage features adjacent to the Mine. The berm prevents any runoff from the Mine facilities from discharging to the local drainage or any alluvial channels or other features outside the Mine footprint. The catchment area of the local drainage has been characterized as approximately 2.3 square miles[19]. There is no evidence to suggest that there are areas of rapid infiltration existing on the Mine or in the immediate area of the breccia pipe itself. These areas would manifest as closed depressions where water would accumulate and rapidly infiltrate. While such features are known to exist in some areas of the plateau, particularly along major faults and north of the Grand Canyon, they are not observed at the Mine.

Precipitation infiltration occurs through the primary porosity of the overburden soils and Moenkopi and the upper Coconino formation. On-site storm water is directed to the lined Non-Stormwater Impoundment, reducing the time for any infiltration, and preventing off-site migration into the natural local drainage. From an operational standpoint, the storm water patterns suggest nearly all the storm water enters the pond and very little infiltrates. Precipitation tends to pond on the surface and the Permittee has graded the Mine to promote drainage to the lined Non-Stormwater Impoundment. If there were any macro features such as buried alluvial channels that create areas of high infiltration, it would be evident in the storm water drainage patterns.

Based on the Mine geology, infiltration estimates, and transport characteristics of uranium, the finite life of the Mine (est. 10 years) is not sufficient for significant leaching of contaminants from ground surface to the C-aquifer. However, based on these concerns and out of an abundance of caution, ADEQ is requiring surface controls and monitoring of the C-aquifer and then removal of any contaminated surface soils upon closure.

GEOCHEMICAL SIMILARITY OF C-AQUIFER AND R-AQUIFER

Commenters noted certain geochemical similarities between the C-aquifer and the R-aquifer groundwater at the Mine and cited this as evidence for a hydrogeologic connection at the Mine between the C-aquifer and R-aquifer. Commenters referenced a study by Solder et al., 2020 to support this assertion.

A commenter asked ADEQ to provide data to support the contention that the age of the perched groundwater encountered within the Coconino aquifer is more than 10,000 years old. The commenter

[19] Hydro Geo Chem, Inc., 2020. Pinyon Plain Mine Hydrogeologic Report, Kaibab National Forest, Coconino County, Arizona, prepared for: Energy Fuels Resources (USA) Inc, sealed by Abra J. Bentley, Arizona Registered Geologist (No. 54327), dated November 11, 2020. 760 p., the report includes 7 Tables, 10 Figures, and appendices A through G.

cites regional USGS studies of the groundwater and springs of the Coconino Plateau and surrounding areas (Bills et al., 2007[20]) that states:

> "Tritium and carbon-14 results indicate that groundwater discharging at most springs and streams is a mixture of young and old ground waters, likely resulting from multiple flow paths and multiple recharge areas."

ADEQ Response

ADEQ acknowledges the regional USGS studies that discuss mixing of young and old waters in the region at springs along the South Rim. However, the regional comparison of geochemical "fingerprints" between the C-aquifer and R-aquifer, offered in a number of comments, is not a basis to conclude there is significant vertical flow from the C-aquifer to the R-aquifer at the local Mine scale. Multiple lines of evidence measured at the Mine show this is not the case, and any geochemical similarity may be related simply to the chemical similarity in rock type or other factors unrelated to flow across the thick aquitard present at the Mine.

Although the Solder et al. (2020)[21] report suggests there is a hydrologic connection between the C-aquifer and R-aquifer based on "similarity" of groundwater age between the two aquifers at the Canyon Mine Observation Well and "nearby Redwall-Muav aquifer wells", the findings in the report suggest ***either*** *"...a hydrologic connection in the area of Canyon Mine* ***or*** *[emphasis added] similar recharge sources and groundwater velocities to that hydrologic position in the two systems" (pg. 1604).*

The mean age dating data are not adequate to conclude an interconnection and the multiple lines of evidence available must be considered. A connection between the Coconino and Redwall-Muav aquifers in the vicinity of the Mine is not supported based on multiple lines of evidence presented in Solder et al. (2020) and other documents, including:

- *Site setting - geology, hydrogeology*
- *Mean groundwater age*
- *Groundwater tritium content*
- *Groundwater geochemistry*
- *Stable isotopes of water*

These lines of evidence are presented in the following sections:

Site Setting – Geology

Review of these lines of evidence suggests the site geology does not support connection between aquifers:

- *The R-aquifer is approximately 3,000 ft beneath the Mine's surface.*

[20] Bills, D.J., Flynn, M.E., and Monroe, S.A., 2007, Hydrogeology of the Coconino Plateau and adjacent areas, Coconino and Yavapai Counties, Arizona (ver. 1.1, March 2016): U.S. Geological Survey Scientific Investigations Report 2005– 5222, 101 p., 4 plates, http://dx.doi.org/10.3133/sir20055222

[21] Solder et al., 2020. Rethinking groundwater flow on the South Rim of the Grand Canyon, USA: characterizing recharge sources and flow paths with environmental tracers. Hydrogeology Journal 28: 1593- 1613. https://link.springer.com/article/10.1007/s10040-020-02193-z

- *The C-aquifer is approximately 800 to 1,000 feet beneath the Mine's surface.*
- *Approximately 2,000 feet of bedrock separates the C- and R-aquifers.*
- *Groundwater in the Coconino Sandstone is "perched" above the R-aquifer.*
- *The C-aquifer is perched because the very low permeability of underlying rock restricts downward migration of water.*
- *Breccia pipe-related fractures are generally "well healed" (mineralized or cemented).*
- *Permeability of the mineralized brecciated rock is very low and restricts downward migration of the C-aquifer.*

Site Setting – Hydrogeology

Review of these lines of evidence suggests the site hydrogeology does not support connection between aquifers:

- *C-aquifer is discontinuous in the study area.*
- *Numerous wells drilled to C-aquifer in the study area are dry.*
- *R-aquifer water beneath the Mine does not flow towards the Grand Canyon South Rim.*
- *C-aquifer flows radially from groundwater high at the South Rim.*[22]

Mean Groundwater Age

Review of these lines of evidence suggests the mean groundwater ages do not support connection between aquifers:

- *Mean carbon-14 ages of groundwater from monitoring wells are (Solder et al. 2020*[23]*, Table 2):*
  - *Coconino Aquifer:*
    - *Pinyon Plain Mine Observation Well (C-Aquifer) - 10,644 years.*
  - *Redwall-Muav Aquifer:*
    - *Pinyon Plain Mine Well (R-aquifer) - 12,040 years.*
- *Mean groundwater age in the C-aquifer well at the Mine is almost 1,400 years younger than in the R-aquifer well.*
  - *This is a substantial difference in age that does not infer a connection between the two aquifers.*
- *There are no other wells in the study near the Mine completed in either aquifer.*
  - *Closest well is Patch Karr Well approximately 30 kilometers from the Mine.*

Groundwater Tritium Content

[22] Bills, D.J., Flynn, M.E., and Monroe, S.A., 2007, Hydrogeology of the Coconino Plateau and adjacent areas, Coconino and Yavapai Counties, Arizona: U.S. Geological Survey Scientific Investigations Report 2005–5222, version 1.1, 101 p., 4 plates, https://dx.doi.org/10.3133/sir20055222v1.1.

[23] Solder et al., 2020. Rethinking groundwater flow on the South Rim of the Grand Canyon, USA: characterizing recharge sources and flow paths with environmental tracers. Hydrogeology Journal 28: 1593- 1613. https://link.springer.com/article/10.1007/s10040-020-02193-z

Review of these lines of evidence suggests the mean tritium content does not support connection between aquifers:

- *Tritium activity is lower in Coconino groundwater than in Redwall-Muav groundwater. Mean tritium content of the groundwater from monitoring wells are (Solder et al., 2020, Table 2):*
  - *Coconino Aquifer:*
    - *Canyon Mine Observation Well (referred to in this document as USGS C-aquifer well at the Mine) - "0.03" tritium units (TU).*
  - *Redwall-Muav Aquifer:*
    - *Canyon Mine Well (referred to in this document as R-aquifer well on Mine) - "0.08" TU.*
- *The tritium activity values would be expected to be higher in the C-aquifer if there was connection between aquifers because the C-aquifer is more closely connected to surface infiltration, which is the source of atmospheric tritium.*
- *The low reported average tritium activities for groundwater below the detection limit (C-aquifer "0.03" TU, R-aquifer "0.08" TU) indicate that these data are not reliable. The Solder et al. (2020) paper does not include discussion of tritium detection limits, and only refers to "detectable amounts of tritium". ADEQ understands, from conversations with the authors, that the samples were run at the USGS Menlo Park tritium lab which reports a 0.5 pCi/L detection limit, which is approximately equal to 0.16 TU.[24].*
- *The possible presence of terrigenic tritium (derived from natural earth materials) has not been ruled out as a tritium source to groundwater in addition to atmospheric tritium. This adds additional uncertainty in drawing conclusions from the tritium data as it will be measured along with the atmospheric tritium and reduces the ability to use tritium to determine connectivity between the aquifers.*

Groundwater Geochemistry

Review of these lines of evidence suggests that groundwater geochemistry data do not support connection between aquifers:

- *Major Ions - Water Type*
  - *Beisner et al. (2020).[25] presented a trilinear Piper plot for groundwater in the South Rim area.*
  - *The Canyon Mine Well (R-aquifer) is characterized as a magnesium-bicarbonate type groundwater.*
  - *Data for the C-aquifer well were not presented - data downloaded from USGS also indicate magnesium-bicarbonate type groundwater; however, Coconino groundwater has relatively more sulfate than Redwall-Muav groundwater.*
- *Dissolved Oxygen*
  - *Redwall-Muav groundwater is oxygenated with dissolved oxygen ~5 mg/L.*
  - *Coconino groundwater is anoxic and dissolved oxygen generally not detected.*
- *Reduction-oxidation (redox) sensitive constituents*

[24] USGS Menlo Park Laboratory Tritium Detection limit: https://water.usgs.gov/nrp/menlo-park-tritium-laboratory/

[25] Beisner, K. R., Solder, J. E., Tillman, F. D., Anderson, J. R. & Antweiler, R. C. Geochemical characterization of groundwater evolution south of Grand Canyon, Arizona (USA). Hydrogeol. J. 28, 1615–1633. https://doi.org/10.1007/s10040-020-02192-0 (2020)

- *Orders of magnitude differences in iron (Fe) and manganese (Mn) concentrations (units µg/L):*
  - *Coconino: Fe ~3,000 Mn ~100*
  - *Redwall-Muav: Fe 14 Mn 4*

Stable Isotopes of Water[26]

Review of these lines of evidence suggests that stable isotope data do not support connection between aquifers:

- *Stable O and H isotopes of water can be used to infer origin of recharge and differences in water from different groundwater sources.*
- *Isotopic compositions consistent for each location over multiple sampling events.*
- *Stable O and H isotopes of groundwater for the C-aquifer and R-aquifer wells are distinctly different.*
- *Difference is sufficient to infer C-aquifer and R-aquifer well water is derived from different recharge sources.*

C-AQUIFER PRODUCTIVITY AND TESTING

Commenters expressed concern that the presence of appreciable water in the C-aquifer was not considered as part of the Individual APP Permit. Furthermore, commenters expressed concerns that ADEQ has not considered the USGS information collected since the 1993 APP Permit and 1986 EIS, which has further defined the C-aquifer. The comments also state that rigorous pumping tests of the C-aquifer have not been conducted.

ADEQ Response

The Individual APP Permit recognizes the presence and importance of the C-aquifer at the Mine. The monitoring program required in the Individual APP Permit includes three new C-aquifer monitoring wells. ADEQ required these wells due to the presence of the thicker and more productive C-aquifer (compared to the 1993 findings). The C-aquifer is likely continuous beyond the immediate vicinity of the Mine and ADEQ recognizes that the full extent of the C-aquifer in the vicinity of the Mine is not defined. The previous characterizations of the C-aquifer from the 1980's and 90's, discussed in the comments, are no longer relevant.

Pumping the shaft and monitoring the response of the C-aquifer at monitoring wells serves as a long-term pumping test of the aquifer and allows for calculating transmissivity and storage in the aquifer. The new monitoring wells at the Mine will refine the understanding of the groundwater flow direction in the C-aquifer. The Individual APP Permit increases understanding of the C-aquifer hydrogeology by requiring controls and groundwater monitoring at the Mine during and after Mine operations. This monitoring will create a database of C-aquifer chemistry and flow patterns that will be evaluated during operation and post-closure monitoring.

HORIZONTAL GROUNDWATER MOVEMENT

Comments and ADEQ responses related to horizontal groundwater movement are addressed in the following subsections.

[26] Solder, J.E., Beisner, K.R. Critical evaluation of stable isotope mixing end-members for estimating groundwater recharge sources: case study from the South Rim of the Grand Canyon, Arizona, USA. Hydrogeol J 28, 1575–1591 (2020). https://doi.org/10.1007/s10040-020-02194-y

HYDRAULIC CONNECTION TO SPRINGS IN THE GRAND CANYON

Commenters expressed concern that there is a hydraulic connection between the aquifers at the Mine and springs in the Grand Canyon. Many comments discuss the geochemical similarity of water in springs at the Grand Canyon and groundwater at the Mine and other south rim locations. Many commenters take issue with assessment of groundwater flow direction and point out that major faults and structures such as the Vishnu Fault, the Bright Angel Fault, and Mckee Fault are major features affecting groundwater flow in the Grand Canyon area.

ADEQ Response

Geochemical fingerprints of the springs and groundwater in the area do not indicate flow or direct hydraulic connection between the C-aquifer and the R-aquifer and springs in the Grand Canyon, or the time scale of the connection. Determining a hydraulic connection between groundwater and a spring requires multiple lines of evidence, including groundwater hydraulics, structure, travel times, as well as geochemical data. The springs in the Grand Canyon are fed by the adjacent areas of the C- and R- aquifers as the geochemistry and hydrogeology of the region shows. The modeling and papers that ADEQ cites, in this responsiveness summary, show the flow is away from the Grand Canyon in the vicinity of the Mine. This is consistent with geochemical fingerprinting because the fingerprinting alone is not sufficient to establish a hydraulic connection.

Importantly, ADEQ's evaluation of groundwater flow at the Mine does not mean ADEQ assumes the springs in the Grand Canyon are not connected to the C-aquifer and R-aquifer. The age dating of the groundwater shows the groundwaters at the Mine is in the range of 10,000 years old ("age" meaning when last exposed to the atmosphere)[27]. Even allowing for uncertainties in dating, this shows that any flow to the springs in the Grand Canyon would occur over millennia. The Individual APP Permit is designed to monitor for potential releases to groundwater from the Mine itself and establishes compliance points where groundwater must meet aquifer quality standards at the Mine. This monitoring program allows sufficient time to address any releases well in advance of any potential impacts to Grand Canyon springs or other receptors toward or away from the Grand Canyon.

ADEQ's interpretation of USGS studies (CARAMP; NARGFM, Solder et al, 2020) are part of the CSM ADEQ developed. Importantly, the flow direction in these aquifers did not reduce the need or the scope of controls and monitoring required in the Individual APP Permit. The Individual APP Permit, including the controls and monitoring required, are designed to protect groundwater regardless of its discharge location or flow direction. Presently, C-aquifer flow at the Mine is toward the shaft, due to the influence of pumping. The pre-pumping flow direction is not known, as recognized by ADEQ and the Permittee[28], and determining the precise flow direction when pumping stops at closure will require monitoring during post-closure as the C-

[27] Solder, J.E., Beisner, K.R., Anderson, J. et al. Rethinking groundwater flow on the South Rim of the Grand Canyon, USA: characterizing recharge sources and flow paths with environmental tracers. Hydrogeol J 28, 1593–1613 (2020). https://doi.org/10.1007/s10040-020-02193-z

[28] Hydro Geo Chem, Inc., 2020. Pinyon Plain Mine Hydrogeologic Report, Kaibab National Forest, Coconino County, Arizona, prepared by (Volume II: Appendix A - Hydrogeologic Report in the application submittal), sealed by Abra J. Bentley, Arizona Registered Geologist (No. 54327), dated November 11, 2020. The report includes appendices A through G.

aquifer recovers. Based on this monitoring data, ADEQ has the authority to require additional monitoring wells to assure the downgradient flow is monitored during post-closure.

TRACER TESTS

Commenters suggest tracer tests should be conducted as part of characterizing the groundwater flow system.

ADEQ Response

There are different types of tracers used in hydrologic investigations. It is important to distinguish between two types: natural and artificial. Some tracers occur naturally in the environment and others are introduced experimentally (artificial). In evaluating the Individual APP application, ADEQ reviewed regional USGS reports using atmospheric tracers and natural environmental tracers such as stable isotopes. Those methods are differentiated from artificial experimental hydrologic dye or chemical tracers added by investigators to a groundwater system to evaluate flow paths and travel times and distances. There are no springs or other features at the Mine in which to conduct experimental dye or chemical tracer tests. ADEQ is aware that these types of tests have been performed in the regions around the Grand Canyon and in other states where karst features exist. Comparisons of the Mine to the well-known karst regions of Minnesota, Kentucky and other areas discussed in comments are not appropriate or applicable to this area of the plateau since they are different geologic, hydrologic, and climatic settings.

The nearest springs are on the order of 10 miles away in the Grand Canyon, and based on groundwater travel time, conducting an experimental (artificial) tracer study would not be practical as the tracer would require decades or longer to measure. Moreover, if an experimental tracer was injected into the C-aquifer at the Mine, through a well for example, it would be captured by the pumping of the shaft and provide no meaningful information.

Many commenters discussed faults, karst features and geologic structure in areas distant from the Mine. In general, ADEQ acknowledges that there are areas of the plateau where these features are important to understanding regional hydrogeology. Many of the observations in comments are general in nature and do not apply to the specific hydrogeology of the Mine. No major faults or karst features have been found at the Mine based on extensive exploratory drilling, regional studies, and the installation of new monitoring wells.

POTENTIAL FOR NORTHWARD GROUNDWATER FLOW

One commenter presented a series of figures (labeled 7a through 7c) showing modeling results for a real estate development near the Grand Canyon as evidence of northward groundwater flow at the Mine. These figures show a simulated drawdown from a proposed pumping well for the proposed development.

ADEQ Response

The figures presented by Dr. Kreamer (pages 20-22), in his written public comment depicting modeling results for a development near the Grand Canyon, show simulated drawdown from a proposed pumping well for the development. The figures lack scale or details, but the proposed pumping well appears to be located on the Vishnu Fault north of Tusayan. The aquifers are not labeled on the figures but the comment suggests it is the R-aquifer. The figures do not clarify what the pumping rate is, or what the ambient flow pattern was prior to pumping. This modeling does not accurately represent or simulate conditions at the Mine or show flow toward the Grand

Canyon springs. The pumping well shown appears significantly closer to the Grand Canyon and in a geologic fault not present at the Mine. This model was prepared to focus on water resource availability for a master-planned development. The model was not peer reviewed or published (ADEQ understands it was done by a consultant), and its calibration, sensitivity analysis, and limitations are not referenced in the comment or published and thus carry little scientific weight and are not technically useful for ADEQ's consideration.

Many comments noted that a previous estimate of recharge prepared in the 1980's has been demonstrated to underestimate the inflow into the Mine. ADEQ did not rely on the 1980's estimates of Mine in-flow in preparing the draft Individual APP Permit. The actual pumping for mine dewatering has demonstrated a flow of approximately 19 gpm, as compared to the past estimates of approximately 2.5 gpm. This difference is significant but not unexpected due to the data available and uncertainties at the time of the original estimate. ADEQ is not relying on the previous estimates of Mine flow and instead has appropriately based the monitoring program and APP Permit on the actual pumping rates. As discussed above, the current CSM shows that the C-aquifer is present at the Mine and that its horizontal extent extends well beyond the Mine.

FUTURE GROUNDWATER RESOURCE DEVELOPMENT

One commenter expressed concern that future groundwater use within the Tusayan area could result in a reduction of the hydraulic head of the R-Aquifer below the hydraulic heads in the C-Aquifer, allowing contaminants in the C-Aquifer to migrate to the R-Aquifer and eventually to the Supai Village water supply. The commenter explains that the concern is increased in the period of time after closure. The commenter asserts that the Permittee places emphasis on the respective hydraulic heads of the two aquifers as being a naturally-occurring barrier to prevent pollutant migration between the aquifers, but that this scenario demonstrates that it may not always be the case and represents an unconsidered event where pollutants discharged will cause or contribute to a violation.

The commenter refers to a current proposal (the "Stilo Project") to develop areas around Tusayan and other locations to validate this concern. The commenter expressed an additional concern over the potential that groundwater pumping occurring around Tusayan could shift the groundwater divide south of the Mine at some point in time, reversing the direction of groundwater flow within the R-Aquifer underneath the Mine toward springs on the South Rim of the Grand Canyon.

The commenter acknowledges that while ADEQ mandates safeguards at the Mine, nothing that EFRI can do will affect or prevent future increases in groundwater withdrawals from the R-Aquifer. The commenter asserts that measures intended to mitigate these hydraulic effects on the breccia pipe and groundwater flow paths are absent from the APP Permit.

ADEQ Response

ADEQ disagrees that a hypothetical lowering of the head in the R-aquifer will increase the rate of leakage from the C-aquifer. The R-aquifer and C-aquifer are separated by a thick unsaturated zone, so any leakage is controlled by gravity and the low permeability of the aquitard, not the head difference between the aquifers. The head difference and artesian pressure in the R-aquifer are not a "hydraulic barrier" as the comment suggests, but rather evidence of the low permeability of the aquitard.

3.1.1.4. GROUNDWATER QUANTITY

Commenters expressed concern over the potential for depletion of groundwater supplies during periods of drought. The concerns raised were focused on the quantity of water pumped from the Mine shaft that penetrates the C-aquifer allowing seeps of about 20 gpm to collect in the lined Mine shaft sump, which are pumped to the surface and discharged to the lined Non-Stormwater Impoundment. Commenters expressed concern that the removal of water seeping into the Mine shaft from the C-aquifer can deplete the water resources that feed groundwater-dependent ecosystems ("GDEs") such as seeps and springs along the south rim of the Grand Canyon.

ADEQ Response

The APP solely regulates discharges of pollutants to Arizona's groundwater to protect groundwater quality. As such, ADEQ does not have the legal authority to address concerns regarding groundwater depletion in the Individual APP Permit.

3.1.1.5. GROUNDWATER QUALITY

Commenters expressed a range of potential groundwater quality concerns:

POTENTIAL FOR POST MINING COLLAPSE

Commenters expressed a concern regarding the potential for post-mining collapse of the shaft and Mine workings, including the possibility that water filling the Mine workings would increase permeability and change the oxidation-reduction (redox) conditions leading to solubilization of uranium.

ADEQ Response

ADEQ finds that the probability of post-closure collapse of the production voids left by mining is remote because of the mining methods that leave pillars in place and rock strength. Refer to the Mine Subsidence section for further details. However, the Individual APP Permit addresses these concerns by requiring monitoring and evaluation of geochemical data collected during operation and during a 30-year post-closure period.

In addition, future chemical conditions in the Mine voids (pH, Eh, redox, dissolved oxygen, alkalinity, major ions, temperature, etc.) cannot presently be known and therefore will be monitored during operation of the Mine. Water quality and geochemistry in both monitoring wells and dewatering from the Mine will be monitored during Mine operations and this data will be used to evaluate the potential for uranium dissolution and transport.

POTENTIAL CHANGES IN GEOCHEMISTRY

Commenters expressed the concern that mining, by creating void space and subsequent increased exposure of rock within the ore zone to oxygen, will change the geochemistry and potentially mobilize uranium (and other constituents) into groundwater. One comment notes:

> "...high oxygen subsurface environments can promote dissolution of uranium (U+6) into groundwater, whereas reducing environments foster precipitation of dissolved uranium (U+4) to solid form."

Commenters emphasize that these processes were part of the mechanisms that led to the deposition of uranium in the breccia pipes.

Commenters also observed that the chemistry of the water pumped from the shaft shows an increase in uranium and arsenic since 2015 coincident with the deepening of the shaft in 2016-17. Comments attribute this to increased oxygenation as the shaft was deepend.

Commenters presented details on the range of uranium solubility under changing redox conditions and stated that ADEQ considered only pH changes and not other key geochemical indicators, in particular redox potential (also known as oxidation / reduction potential, ORP or Eh)[29], which is a measure of the redox potential of a solution. Commenters emphasize that phase diagrams are useful in understanding uranium geochemistry. Commenters state that changes in geochemistry due to these factors "... are not monitored nor accounted for in the Draft Aquifer Protection Permit or post-closure plans."

ADEQ Response

In the Individual APP Permit application, the Permittee presented information concerning dissolved oxygen conditions and the geochemical behavior of uranium under various reduction-oxidation conditions (redox). ADEQ considered this information in preparing the Individual APP Permit.

During closure, the main shaft and the ventilation shaft will be backfilled and sealed-off from water bearing zones. This closure will also reduce the availability of oxygen in the mined zone and oxidation-related chemistry is not expected to persist after the shaft is sealed.

As the comments and ADEQ's evaluation show, uranium geochemistry may follow different geochemical processes whereby uranium may exist in a variety of oxidation states with different solubilities and transport characteristics. The monitoring program includes a full suite of geochemical parameters to characterize the geochemistry, including pH, oxygen, and Eh. The water pumped from the Mine will provide an ongoing database of geochemistry behavior in the Mine and will inform ADEQ decisions on future and post-closure monitoring.

One commenter suggested the increases in uranium concentrations in the shaft pumping water to date show uranium is being mobilized due to oxidation. Data do not support this hypothesis; the uranium concentration increased when the shaft was deepened into the lower portions of the C-aquifer and, since then, has been a stable variable. Figure 1 shows that when the shaft extended only into the upper C-aquifer, concentrations were low, which is consistent with other samples from the C-aquifer. When the shaft reached 1,400 feet, concentration increased to higher levels as deeper groundwater was encountered. Subsequent concentrations were variable but did not show an increasing trend and the recent samples shown on the graph are lower than the samples immediately after the shaft reached 1,400 feet. The uranium sample from third quarter 2016, the first peak after the shaft was deepened, was 130 ug/L. The subsequent peaks were similar at 126

[29]Redox potential is a measure of the tendency of a chemical species to acquire electrons from or lose electrons to an electrode and thereby be reduced or oxidized respectively. Redox potential is measured in volts (V), or millivolts. Each species has its own intrinsic redox potential; for example, the more positive the reduction potential, the greater the species' affinity for electrons and tendency to be reduced.

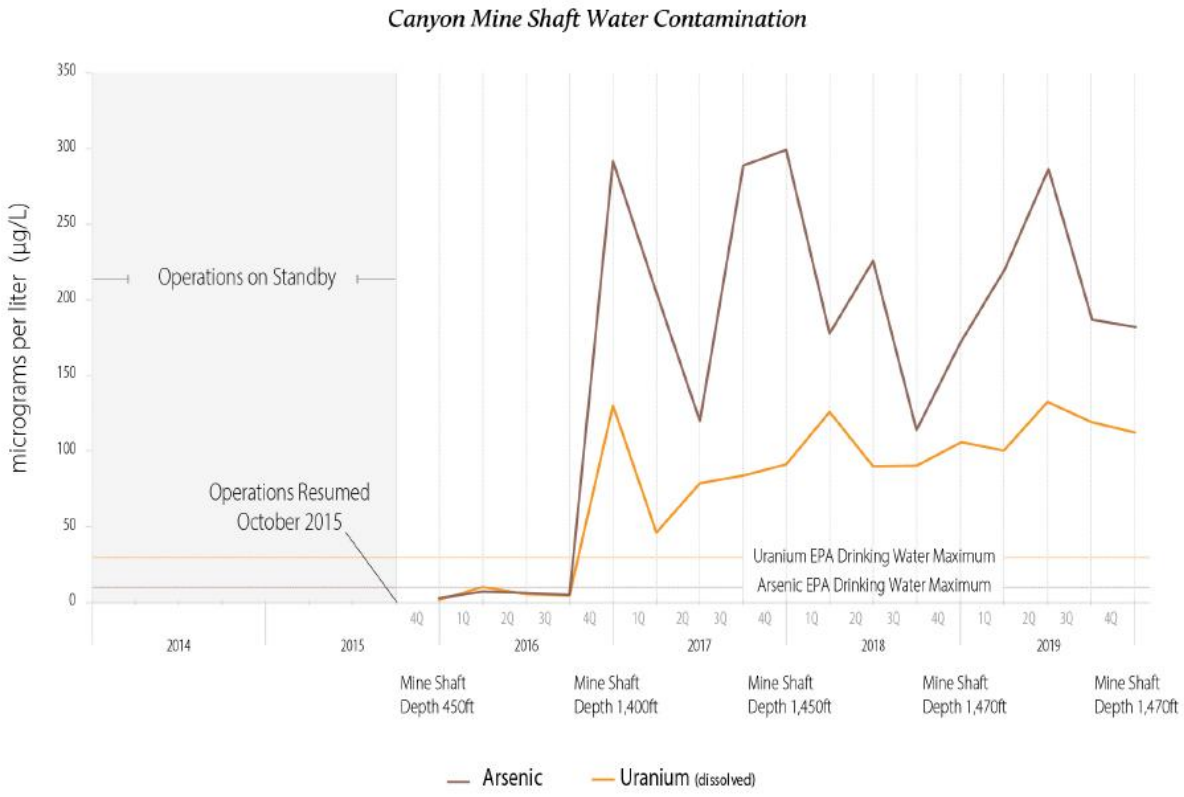
In the field of environmental chemistry, the reduction potential is used to determine if oxidizing or reducing conditions are prevalent in water or soil, and to predict the states of different chemical species in the water, such as dissolved metals. The reduction potentials in natural systems often lie comparatively near one of the boundaries of the stability region of water. Aerated surface water, rivers, lakes, oceans, rainwater and acid mine water, usually have oxidizing conditions (positive potentials). In places with limitations in air supply, such as submerged soils, swamps and marine sediments, reducing conditions (negative potentials) are the norm.

Source: https://en.wikipedia.org/wiki/Reduction_potential

ug/l and 132 ug/l, and not significantly different. Since the samples are composites from the two water rings in the shaft, and since the relative contributions from each isn't known for each sampling period, the conclusions made by the commenter are not supported.

The graph (Figure 1) does not support the comment that deepening the shaft increased the rate of uranium and arsenic dissolution. The shaft does not intersect the breccia pipe and so does not represent geochemistry during future mining operations. Rather, it is important to recognize that these concentrations reflect natural metal concentrations in the formations. Moreover, this water is being pumped out to the lined Non-Stormwater Impoundment at the surface and does not re-enter the aquifer system.

Figure 1 Kreamer graph for upper C-aquifer concentrations.



POTENTIAL FOR ACID GENERATION IN MINE WORKINGS

Commenters expressed concern regarding the potential for acid generation due to the exposure of sulfide mineralization to groundwater during mining and the potential for increasing uranium mobility.

ADEQ Response

The potential for acid generation or neutralization within the Mine depends on several factors:

- *the chemistry of the rock (acid generation or neutralization potential and buffering capacity),*
- *the absence (dry) or quantity of water moving through it, and*
- *the presence or absence and persistence of exposure to oxygen.*

Exposure to oxygen is necessary to generate acid through the oxidation of the rock chemistry. These factors can be measured directly and accurately during the operational period. Such quantification supports a geochemical assessment of actual acid generation and neutralization of the Mine voids, as a required part of the closure plan.

During the operational period, the mine workings will be exposed to oxygen (oxidizing conditions). After closure, when the mine shaft is sealed, the oxygen exposure ceases and any remaining oxygen will be quickly consumed and depleted (reducing conditions). Uranium is generally mobile under oxidizing conditions and immobile under reducing conditions. With no persistent exposure to oxygen in post-closure, acid generation potential ceases to be an issue. In addition, the buffering capacity of the carbonates in the rock found in the geology of this site will have a substantial neutralizing effect on any acid generated.

ADEQ considered the potential for increasing uranium mobility and potential for acid generation in the event of Mine collapse. The Individual APP Permit requires a 30-year post-closure monitoring period and adds the limitation on mining within the C-aquifer zone. Although 30-year post-closure monitoring was not originally required, the Permittee has agreed to conduct 30-year post-closure monitoring to provide assurances that the operational life of the facility does not result in degradation of the C and R aquifers. Additionally, the Permittee has agreed that mining is not to occur above 5340 ft AMSL, reflecting the Permittee's acknowledgment that it does not plan to mine in that zone. The mine shaft will be backfilled and sealed off from the surface, eliminating exposure to oxygen. Plugs and seals will be placed in the shaft adjacent to water bearing zones to isolate mine workings and maintain dry separation, preventing contact with backfilled material within the shaft below the C-aquifer zone. This effectively mitigates the potential for acid generation.

Monitoring over the life of the Mine and after closure will assess the potential from a geotechnical, structural, and chemical perspective. Monitoring during mining of the breccia pipe will provide data on both quantities of infiltration and the geochemistry of the Mine void. Based on these data, ADEQ has the authority to require additional monitoring, testing, and mitigation of any groundwater contamination. For additional information on this matter, refer to the Mine Subsidence Section of this Responsiveness Summary.

BASELINE AND AMBIENT BACKGROUND GROUNDWATER CONDITIONS

Commenters expressed concern that baseline or ambient background groundwater conditions have not been established. Related comments expressed concern that monitoring wells hydraulically upgradient have not been established.

ADEQ Response

Since mining of the breccia pipe has not started, groundwater data collected to date by both the Permittee and USGS represent baseline and thus ambient groundwater conditions. The general purpose of monitoring upgradient is to determine the groundwater quality as it flows into a (typical) site to distinguish any impacts from the Mine in question.

This baseline data set includes a full geochemical profile of both the C-aquifer and R-aquifer. USGS recognizes that baseline conditions are defined. As Tillman et al.[30] states:

[30] Tillman, F.D., Beisner, K.R., Anderson, J.R. et al. An assessment of uranium in groundwater in the Grand Canyon region. Sci Rep 11, 22157 (2021). https://doi.org/10.1038/s41598-021-01621-8

> *"Having established baseline water chemistry conditions in both the shallow and deeper groundwater systems [ed. C-aquifer and R-aquifer] at the Mine prior to commencement of ore production, continued monitoring throughout the Mine's lifecycle and after reclamation will allow for the assessment of changes that may result from mining activities".*

Future monitoring data will need to be compared to this pre-mining data set to assess whether there has been a potential release from the Mine. The present (i.e., background) chemistry of both the C -aquifer (at the USGS well) and R-aquifer includes detectable concentrations of uranium below the MCL for uranium in drinking water. Utilizing pre-mining baseline data for future compliance comparison will be protective of the aquifers when the POC Alert Levels (ALs) are established.

The shaft pumping also creates an inward flow direction towards the shaft so all the C-aquifer monitoring wells are upgradient of the shaft at the present time. The initial goal of the monitoring program is to detect any potential release. The direction of groundwater flow during mining and during post-closure will be measured in the field as the conditions evolve. ADEQ expects the flow direction to return to pre-mining conditions during the post-closure period. As this occurs, it will become clear which C-aquifer well is upgradient under these conditions. If the flow direction is not adequately monitored, either vertically or horizontally, ADEQ can require a new monitoring well at the time this is determined. This may include the need for further upgradient wells if such wells would help characterize a potential release.

The sampling results collected by the Permittee from the R-aquifer well represent background (pre-mining conditions). The R-aquifer well will serve as a sentry well for any releases. The R-aquifer well location immediately under the mining area makes it a sentry point for potential releases vertically downward from the Mine. In the unlikely event that a release is detected, ADEQ has the authority to require additional R-aquifer wells and mitigation of any groundwater contamination.

ADEQ knows from the shaft pumping samples that dissolved uranium is present in the groundwater entering the shaft. Thus, any infiltration via natural features at the Mine has been ongoing over geologic time. This evidence (in addition to the age dating, geological, and hydrogeological evidence) strongly indicates that there are no macro features (ring fractures, faults, karst features, or other "conduit-flow" features) that act as discreet flow paths from the C-aquifer to the R-aquifer to create a dissolved uranium concern above the MCL in the R-aquifer. This evidence also supports the understanding that the system behaves as an equivalent porous medium (EPM) at the scale of interest applicable to the Individual APP Permit and supports ADEQ's position that the R-aquifer monitoring well provides background conditions and represents the pre-mining groundwater quality. For additional information on this matter, refer to the Groundwater Monitoring Section of this Responsiveness Summary, specifically the discussion of the R-aquifer pumping test and zone of capture, which considers the aquifer an EPM.

3.1.1.6. GROUNDWATER MONITORING

Commenters questioned the adequacy of the proposed monitoring. Commenters state there are design inadequacies in the groundwater monitoring system at the Mine. Commenters' questions relating to the

design of the groundwater monitoring array included a range of topics covered below. Aspects of many of the monitoring comments are also addressed in previous sections.

C-AQUIFER POC WELL(S) ARE "TO BE DETERMINED."

Several commenters expressed concern that the C-aquifer POC well(s) are "to be determined." Commenters expressed the view that this is not technically appropriate and cannot be reviewed by the public.

ADEQ Response

The objective of groundwater monitoring under the Individual APP Permit is to demonstrate and verify compliance with specified requirements, and to identify potential releases to groundwater from the Mine and require corrective action if necessary. There are three wells in the C-aquifer that will be monitored for releases to the C-aquifer. In addition, the water in the Mine shaft will be monitored during operations. Presently, the local flow direction in the C-aquifer is radially inward toward the shaft due to the cone of depression created by the shaft. Thus, there is no meaningful downgradient POC well in the C-aquifer while the Mine is dewatering. Until a downgradient-POC well can be established once dewatering ceases, the Permittee will monitor all three wells in the C-aquifer as POC wells. With shaft pumping, the flow direction in the C-aquifer is inward toward the shaft based on constant pumping and the measured heads in the aquifer. This flow regime will likely return to a pre-mining condition after the Mine closes, the shaft is backfilled and sealed, it ceases to collect water, and the local gradient once again reaches an equilibrium, pre-mining, condition. At that time, ADEQ will determine which well(s) are downgradient of the Mine and determine the POC. If no wells are correctly located, ADEQ will require the Permittee to install a new well. In the interim, ambient groundwater quality in the C-aquifer will be determined prior to mining as per CSI #5.

The general direction of groundwater movement in the perched aquifers in the Mine area is expected to be the same as the dip of the confining strata, which is mainly south to southwest. While the flow direction in the perched C-aquifer is uncertain, it is presumed to be similar to the R-aquifer: south to southwest.

All data and decisions regarding the location of the C-aquifer POC well(s) are public records that are available for review per ADEQ's records policies.

The monitoring requirements in the Individual APP Permit will demonstrate compliance with the established ALs and AQLs at the POC including:

- *Quarterly well sampling of the both the C-aquifer and the R-aquifer during operation and post-closure monitoring period,*
- *A suite of water quality parameters including: metals including uranium, pH, alkalinity, sulfate, dissolved oxygen (DO), and redox potential (also known as oxidation / reduction potential, ORP or Eh)*[31] *to develop data for evaluating the geochemical stability and*

[31] Redox potential is a measure of the tendency of a chemical species to acquire electrons from or lose electrons to an electrode and thereby be reduced or oxidized respectively. Redox potential is measured in volts (V), or millivolts. Each species has its own intrinsic redox potential; for example, the more positive the reduction potential, the greater the species' affinity for electrons and tendency to be reduced.

In the field of environmental chemistry, the reduction potential is used to determine if oxidizing or reducing conditions are prevalent in water or soil, and to predict the states of different chemical species in the water, such as dissolved metals. The

effectiveness of the monitoring network to evaluate aquifer properties to assist in closure plan monitoring design,

- *Annual reports of operating, mining information, sampling of groundwater and discharge monitoring, and*
- *Biennial groundwater monitoring demonstration report.*

The APP authorizing statutes allow ADEQ to require additional measures at any time ADEQ determines more monitoring is warranted.

R-AQUIFER MONITORING WELL

Commenters asserted that the R-aquifer well on-Mine is not adequate for monitoring the R-aquifer for a variety of reasons including its location relative to the Mine. Several commenters expressed concern that the R-aquifer monitoring well is not adequate because the groundwater flow direction is not known.

ADEQ Response

From a hydrogeologic standpoint, the R-aquifer monitoring well at the Mine is essentially immediately below and downgradient of any potential release from the shaft or workings. The thickness, age difference, and hydraulic separation of the C-aquifer and R-aquifer, at the Mine, make the R-aquifer monitoring well an appropriate monitoring point for the low probability potential of leakage and impact above the AWQS. Additionally, the proximity of the R-aquifer monitoring/supply well to the breccia pipe makes it an appropriate monitoring point for detection of a potential release.

The POC well for the R-aquifer will be the existing on-site R-aquifer well, which is also the well required by the USFS. This multi-purpose well is used for both water supply and water quality monitoring. The R-aquifer monitoring well is located north of the discharging facilities, and approximately 450 feet away from the Mine shaft. This well is proposed based on the criteria of A.R.S. § 49-244(2)(b), which allows for an alternative POC that is substantially less costly based on an analysis of the volume and characteristics of the pollutants that may be discharged and the ability of the vadose zone to attenuate the particular pollutants that may be discharged, including such factors as climate, hydrology, geology and soil chemistry. ADEQ has determined that this POC well location is allowable under A.R.S. § 49-244(2)(b) for the following reasons:

- *The operational controls and natural protections as summarized in Section 12 of the Hydrogeology Report, and as detailed in the body of the report.*
- *With regard to the location of the POC well location for the R-aquifer, ADEQ notes that (Application, Appendix A Hydrogeology Report, pages 37-39; Responding Brief testimony of Dr. Errol Montgomery), any potential downward seepage from the Mine shaft would disperse downward and outward in the shape of a cone. The Mine shaft would be the apex of this "cone of dispersion". Any seepage would slowly migrate vertically through over 500 feet of impermeable rock and disperse outward. The base of*

reduction potentials in natural systems often lie comparatively near one of the boundaries of the stability region of water. Aerated surface water, rivers, lakes, oceans, rainwater and acid mine water, usually have oxidizing conditions (positive potentials). In places with limitations in air supply, such as submerged soils, swamps and marine sediments, reducing conditions (negative potentials) are the norm.

Source: https://en.wikipedia.org/wiki/Reduction_potential

the cone of dispersion would be larger than the 17.4 acre Mine, so that the R-aquifer well will be within this cone of dispersion. While the on-site well may not be directly downgradient from the discharging facilities (regional groundwater elevation contours mapped by the USGS, suggest the flow direction in the R-aquifer is south to southwest.)[32]*, it will be located sufficiently close to the facilities to detect contamination in the R-aquifer resulting from any seepage from the Mine shaft.*

- *Given the technical acceptability of the existing R-aquifer well, ADEQ finds it meets the alternate POC requirements of the statute and is substantially less costly than installing a new well.*
- *Because the R-aquifer monitoring well will also serve as a water supply well, a radially-inward groundwater gradient will be created around the well by pumping operations. Therefore, the monitoring well will continually capture groundwater at the Mine during mining operations and will serve as a downgradient monitoring point.*

Based on regional groundwater elevation contours mapped by the USGS, the groundwater flow direction in the R-aquifer is south to southwest.[33]

DIRECTION AND VELOCITY OF GROUNDWATER FLOW

Commenters expressed concerns about the uncertainty of direction and velocity of groundwater flow in establishing POC well locations.

ADEQ Response

With shaft pumping, the flow direction in the C-aquifer is inward toward the shaft based on constant pumping and the measured heads in the aquifer. The groundwater velocity is also thus controlled by the pumping. ADEQ acknowledges that the background C-aquifer flow direction and velocity cannot be measured while the pumping is active. The water levels do not indicate significant response behavior to any heterogeneities (faults, fractures etc.) at the scale of interest (see also Groundwater Movement responses). Therefore, the water levels in the C-aquifer allow ADEQ to accurately measure groundwater flow direction and velocity. Based on these observations, the C-aquifer can be considered an EPM)[34] *at the Mine.*

The R-aquifer is monitored by the existing monitoring and production well located within the expected influence of any vertical leakage from the C-aquifer to the R-aquifer.

AQUIFER CHARACTERISTICS

Commenters had concerns over aspects of aquifer characteristics described in the application and permit. Suggesting ADEQ considers it simple and nearly homogeneous and isotropic, when it could be complicated by heterogeneities, faults, fractures, breccia pipes, or leaky aquitards.

[32] Bills, D.J., Flynn, M.E., and Monroe, S.A., 2007, Hydrogeology of the Coconino Plateau and adjacent areas, Coconino and Yavapai Counties, Arizona (ver. 1.1, March 2016): U.S. Geological Survey Scientific Investigations Report 2005– 5222, 101 p., 4 plates, http://dx.doi.org/10.3133/sir20055222. See potentiometric surface map on Plate 4.

[33] Id.

[34] EPM (equivalent porous medium) refers to the scale at which a fractured rock aquifer behaves as a typical porous or granular aquifer.

ADEQ Response

Discussed under groundwater movement and groundwater quantity, the aquifer characteristics of the C-aquifer are well understood based on the ongoing pumping of the shaft which comprised a long-term pumping test of the entire thickness of the C-aquifer. A pumping test on the R-aquifer was used to calculate its transmissivity. These tests provided the aquifer characteristics necessary to design the monitoring system.

AQUIFER THICKNESS

Commenters expressed concern about the uncertainty of aquifer thickness.

ADEQ Response

The thickness of the R-aquifer and the C-aquifer at the Mine have been measured. The R-aquifer is defined by the R-aquifer monitoring well and the well-documented stratigraphy of the region. The deep regional groundwater flow system occurs within the Redwall-Muav limestone at a depth of 2,242 to 2,980 feet below ground. The Redwall-Muav is approximately 738 feet thick beneath the Mine, with an estimated saturated thickness of approximately 110 feet.

The C-aquifer is fully exposed in the shaft itself and verified by the borings and wells installed to date. The Coconino Formation is approximately 575 feet thick with a saturated thickness of about 184 feet at the Mine. Lesser amounts of perched groundwater occur within the Kaibab and Coconino formations. The Kaibab extends to a depth of approximately 340 feet below land surface (bls). A reportedly small amount of seepage into the Mine shaft has been noted at the Kaibab level near the contact with the Toroweap formation.

PROPERTIES OF POTENTIAL CONTAMINANTS

Commenters expressed concern about properties of potential contaminants.

ADEQ Response

The properties of the contaminants of concern (uranium, arsenic etc.), which exist naturally in the soil, rock and groundwater, are documented in literature. These include solubility, adsorption characteristics, oxidation states, and stability under a range of underlying conditions. Collecting additional water chemistry as the Mine is opened and material is exposed will refine the understanding of these properties at the site-specific setting. Future geochemical conditions are highly dependent on factors that cannot be measured at this time. The Individual APP Permit-requires data to be collected during operational life and post-closure monitoring to inform the understanding of the geochemical conditions. For additional information on this matter, refer to the Groundwater Quality Section of this Responsiveness Summary.

ADEQUACY OF THE MONITORING PLAN

Commenters stated that the proposed monitoring system inadequately monitors the geochemistry of the system and will not detect the changes in redox necessary to assess solubility and migration of uranium and other inorganic constituents.

ADEQ Response

The groundwater monitoring required by the Individual APP Permit is designed to provide early detection if groundwater contamination occurs that exceeds the permitted standards at the POC. The monitoring system is also designed to monitor the changes in redox and other geochemical properties in the groundwater system. If ADEQ discovers changes in geochemistry that could lead to the potential for mobilizing pollutants, the agency has the legal authority to require additional measures to address these changes, order installation of additional monitoring wells, and require appropriate corrective actions and closure designs to stabilize the geochemical conditions. The Individual APP Permit monitoring is designed to address the uncertainties inherent in the hydrogeological setting of the Mine and the changes mining may have on groundwater quality.

SAMPLING SCHEDULE

Commenters expressed concern about the insufficiency of the sampling schedule.

ADEQ Response

The required groundwater monitoring sampling schedule in this Individual APP Permit is quarterly, which is sufficient for potential release detection and compliance monitoring, as changes in groundwater occur slowly over time.

If an exceedance of an AL or AQL is identified as a result of a sampling event, accelerated monitoring will be enacted, which, in this instance, will require an increase in sampling frequency to monthly. To return to the quarterly routine sampling frequency, the Permittee must demonstrate four consecutive monthly sample results less than the AL or AQL. ADEQ has the authority to amend the Individual APP Permit to require changes to the monitoring frequency, if warranted.

USING ALTERNATIVE, INNOVATIVE, GROUNDWATER MONITORING METHODS

Commenters expressed the potential for using alternative, innovative, groundwater monitoring methods to bring a greater understanding of potential contaminant movement and distribution.

ADEQ Response

References in the comments to EPA procedures, and the need for multi-level monitoring, are not applicable at the present time given there is no release to track or characterize. Such measures would become appropriate if a release were identified, and the scope of such measures would depend on the location of the release, which aquifer system is impacted, and the direction of groundwater flow at the time.

POST-CLOSURE MONITORING PERIOD LENGTH IN THE PERMIT

Commenters expressed concern that the post closure monitoring period required in the permit may not be long enough to detect potential releases or impacts to aquifers.

ADEQ Response

In response to public comment, ADEQ has revised the Individual APP Permit to include a 30-year post closure monitoring period. The Permittee will monitor for all contaminants in Table 9 in the Individual APP Permit. If a contaminant is detected in the POC well at a concentration above an AL or AQL, the Permittee must implement the approved Contingency Plan. If after 30-years ADEQ determines there remains a reasonable chance that a pollutant exceeding the AQL will reach an aquifer, ADEQ has the authority to require the Permittee to extend the post-closure monitoring period beyond 30 years.

3.1.2. MINE SUBSIDENCE

Commenters expressed concerns that the Mine workings and breccia pipe may collapse and develop fractures as a result of subsidence creating the potential for groundwater and possibly surface water to seep into the lower level carrying Mine-impacted water. Concerns were also raised that subsidence could increase the potential for sulfide oxidation that could result in formation of acidic conditions within the Mine workings and the potential for leaching and migration of pollutants.

ADEQ Response

ADEQ finds that the probability of post-closure collapse of the production voids left by mining is remote. However, to address concerns regarding the potential for breccia pipe collapse due to subsidence, including leaching and migration of pollutants, ADEQ is adding permit provisions that include monitoring and reporting of these subsurface conditions as well as an extended post-closure monitoring period of 30 years.

Upon closure under Section 2.9.1 of the Individual APP Permit, the Permittee is required to provide an updated closure plan. The updated closure plan must provide an estimate of the material removed from the ore body, using three-dimensional (3D) mapping where accessible. The 3D mapping must include plan views and cross-sectional views showing the void spaces and geologic structures in the ore body. The updated closure plan must also include an evaluation of the stability. Additionally, the Permittee must document the water quality of the water pumped from the shaft which will support a geochemical characterization of the seepage.

Location of Mining Zones Within the Breccia Pipe

The spatial distribution and grade of uranium ore varies vertically and laterally within the breccia pipe. Uranium mineralization is concentrated in an annular ring within the breccia pipe. For purposes of mining the ore, the vertical distribution of uranium ore within the breccia pipe has been organized into six stratigraphic levels or zones (Cap, Upper, Main, Main-Lower, Juniper I and Juniper II).[35] *Note that ore zones at the level of the C-aquifer will not be mined.*

[35]Clarification Submittal – Pinyon Plain Mine Aquifer Protection Permit Application, Inventory No. 100333 and LTF No. 84446, signed by Scott Baaken, co-sealed by Abra J. Bentley, Arizona Registered Geologist (No. 54327), and James G. Peck, Arizona Registered Engineer (No. 37554), dated May 28, 2021 (PDF, 17 pages; 3 figures).

Mining Method

The mining method is a key stability factor. The ore deposit within the breccia pipe will be accessed through lateral drifts and or sprial declines from the Mine shaft at different levels to the target zones described above. From these drifts and declines, stopes (a term meaning irregularly shaped production opening in a metal mine) will be excavated to extract the high-grade ore.

Structural support within the mined stopes in the breccia pipe is provided by natural pillars of mineralized rock that are left standing to distribute the vertical load on the mined area. Roof support will be enhanced by roof bolting and localized support measures where necessary. This type of mining method is generally associated with strong ore and surrounding rock.[36] *This hard rock mining method will leave natural rock pillars in place within the breccia pipe to provide structural support to the stopes. At the Mine, the area supported by rock pillars will be much greater than the volume of the stopes, which is a factor that will increase stability. Because the ore is concentrated in an annular ring within the breccia pipe, the central core of the breccia pipe will remain intact as a pillar to provide structural support.*

Rock Strength and Confining Pressure

The strength of the breccia deposit cementation is another key stability factor. The natural silica cementation of the breccia pipe provides compressive strength equal to or greater than typical concrete. In addition, it's important to consider the effects of confining pressure on the strength of rock at depth. Pressure exists in the subsurface from the weight of the soil and rock above. This pressure compresses the material in the subsurface more and more the further down you go. This pressure is called 'confining pressure'. Confining pressure increases with depth below the ground surface. An increase in confining pressure usually results in an increase in the strength of the rock. The pillars of natural rock are left in place to transfer and distribute these compressive forces from the roof around the stopes and back into the surrounding rock. The support of confining pressures in the rock mass will further suppress growth of microfractures and promote stability of the mined voids within the breccia pipe.

Closure Considerations

No mining will occur within the breccia pipe adjacent to the C-aquifer. During closure, the main shaft and the ventilation shaft will be backfilled and sealed-off from water bearing zones (Figure 5). This will seal off the C-aquifer water from the Mine workings below the level of the Hermit Shale aquitard at the base of the C-aquifer and prevent migration of water into the lower zones. This closure will also reduce the availability of oxygen in the mined zone and oxidation-related chemistry is not expected to persist after the shaft is sealed.

Conclusion

Based on this analysis, ADEQ finds that the probability of post-closure collapse of the production voids left by mining is remote.

3.1.3. DROUGHT AND CLIMATE CHANGE

Commenters expressed concerns relating to climate change, specifically the extended drought in the State of Arizona and the preservation of water resources.

[36] Hartman, H. L., Mutmansky, J. M. (2002). Introductory Mining Engineering. United Kingdom: Wiley. Page 12.

ADEQ Response

The APP, as designed by state law, solely regulates discharges of pollutants to groundwater to protect water quality. The program does not have the legal authority to address climate change or water usage concerns. For additional information on this matter, refer to the Groundwater Quantity Section of the Responsiveness Summary.

3.1.4. NON-WATER QUALITY ENVIRONMENTAL IMPACTS TO SPRINGS ECOSYSTEMS

Commenters expressed concern about the potential environmental impacts of the Mine's withdrawal of millions of gallons of groundwater from the Mine shaft, including potential depletion of the C-aquifer and impact to spring ecosystems. Assertions included how the Individual APP application and draft permit did not consider "non water quality environmental impacts" as required under A.R.S. § 49-243(B)(1)(g) and referenced the clause related to "other terms and conditions as the director deems necessary" under A.R.S. § 49-243(K)(8).

ADEQ Response

A.R.S. § 49-243(B)(1)(g) requires ADEQ to consider "non-water quality environmental impacts" (NWQEI) when determining BADCT for existing facilities. The last sentence in § 49-243(B)(1) states: "In addition, the Director shall consider the following factors for existing facilities:" [which includes (g) Non-water quality environmental impacts]. Defined in A.R.S. § 49-201(18), an:

> *"Existing facility means a facility on which construction began before August 13,1986 and that is neither a new facility nor a closed facility. For the purposes of this definition, construction on a facility has begun if the facility owner or operator has either:*
>
> - *Begun, or caused to begin, as part of a continuous on-site construction program any placement, assembly or installation of a building, structure or equipment.*
> - *Entered into a binding contractual obligation to purchase a building, structure or equipment that is intended to be used in its operation within a reasonable time. Options to purchase or contracts that can be terminated or modified without substantial loss, and contracts for feasibility engineering and design studies, do not constitute a contractual obligation for purposes of this definition."*

Since the construction of Mine's applicable discharging facilities began after August 13, 1986, the facilities do not meet the definition of an existing facility. Additionally, in response to the comment concerning the applicability of A.R.S. § 49-243(K), this citation is inapplicable to groundwater depletion because groundwater resource quantity is outside the scope of the APP. Additional permit terms related to groundwater conservation are not necessary to ensure compliance with A.R.S. Title 49, Chapter 2, Article 3.

Consideration of the Potential for C-Aquifer Depletion and Impact on Springs

Although regulating groundwater quantity is beyond the scope of ADEQ's authorizing statutes for the APP, ADEQ evaluated potential for C-aquifer and/or spring depletion to address public comments.

ADEQ reviewed the potential for depletion of the C-aquifer and seeps and springs at the south rim of the Grand Canyon. Comparing mine shaft dewatering outflows with natural aquifer discharges.[37] gives perspective in evaluating the potential for spring depletion. The amount of water seeping into the mine shaft and pumped to the lined Non-Stormwater Impoundment is approximately 20 gallons per minute, or roughly the rate of flow from a typical garden hose. This amount of seepage is insignificant in comparison with other groundwater discharges, unrelated to the Mine, such as water supply wells or springs. For example, Havasu Creek constantly discharges a steady flow of approximately 28,000 gallons per minute from the C-aquifer.[38]

The mine dewatering activity volume is orders of magnitude less than the sum of other extractions, both natural and anthropogenic. Moreover, as discussed in the Water Quantity Section in this Responsiveness Summary, pumping from the Mine will not impact the C-aquifer beyond the Mine area. Since the operational mine life is finite, the pumping from the dewatering activity is temporary, from a long-term water budget perspective, and the water level at the Mine will recover after plugging, sealing, and backfilling of the mine shaft.

3.2. SOCIAL AND CULTURAL ISSUES

3.2.1. ENVIRONMENTAL JUSTICE

Comments expressed environmental justice ("EJ") concerns related to uranium mining at the Mine.

ADEQ Response

EPA's website states that:

> *Environmental justice (EJ) is the fair treatment and meaningful involvement of all people regardless of race, color, national origin or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies.*
>
> *Fair treatment means no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies.*
>
> *Meaningful involvement means:*
>
> - *People have an opportunity to participate in decisions about activities that may affect their environment and/or health;*
> - *The public's contribution can influence the regulatory agency's decision;*

[37] Pool, D.R., Blasch, K.W., Callegary, J.B., Leake, S.A., and Graser, L.F., 2011, Regional groundwater-flow model of the Redwall-Muav, Coconino, and alluvial basin aquifer systems of northern and central Arizona: U.S. Geological Survey Scientific Investigations Report 2010-5180, v. 1.1, 101 p., Northern Arizona Regional Groundwater Flow Model (NARGFM). https://pubs.usgs.gov/sir/2010/5180/

[38] Rapid Watershed Assessment Report June, 2010. Havasu Canyon Watershed. Prepared by: USDA Natural Resources Conservation Service.

- *Community concerns will be considered in the decision-making process; and*
- *Decision makers will seek out and facilitate the involvement of those potentially affected.*[39]

ADEQ carefully considered and took actions to ensure both fair treatment and meaningful involvement was part of the permitting process. Both before and during the permitting process, ADEQ consulted with Tribes and stakeholders as follows:

- *ADEQ held a Leader to Leader meeting with the Havasupai Tribal Council on August 28, 2018.*
- *ADEQ reached out to all 22 Arizona Federally recognized Tribes in a letter dated May 19, 2021 requesting formal Consultation.*
- *ADEQ held formal Consultation with the Havasupai Tribe virtually on July 12, 2021, in-person August 5, 2021 at Red Butte, and virtually on April 1, 2022.*

In addition to Tribal outreach, public outreach about the permitting process was also provided to the following constituencies:

- *City of Flagstaff*
- *National Park Service - Grand Canyon*
- *Town of Tusayan*
- *Coconino Plateau Water Advisory Council*
- *Coconino County BOS (including County Manager)*
- *Grand Canyon Trust*

As part of the public participation process for an Individual APP Permit, ADEQ is required to hold a 30-day public comment period. For this permit, ADEQ extended the minimum public comment period to 45 days and held a public hearing on August 9, 2021.

While conducting the listening / outreach activities, ADEQ professionals also spent hundreds of hours conducting a comprehensive review of the extensive legal and technical record associated with this facility, including:

- *Environmental studies and permits, (e.g. the USFS EIS and ROD, USFS-approved facility Plan of Operations),*
- *Engineering and hydrogeological reports,*
- *Facility operations and inspections,*
- *Prior ADEQ decisions,*
- *Legal proceedings and challenges*
- *Public comments generated over the last 30 years.*

The record demonstrates, and ADEQ agrees, that adverse impacts to groundwater from the Mine are extremely unlikely. Further, site-specific characteristics demonstrate the low permeability of the geologic formations underlying all surface features as well as an 873-foot separation of impermeable rock between the proposed final depth of the Mine workings and the R-aquifer. The

[39] https://www.epa.gov/environmentaljustice/learn-about-environmental-justice

record supports the conclusion that the potential for negative environmental consequences is very unlikely.

Of particular note, the Mine is currently permitted under three groundwater general permits. The general permits are protective, lawful, and originally issued in 2009 for the Non-stormwater Impoundment (Type 3.04) and 2011 for the Development Rock and Intermediate Ore Stockpiles (Type 2.02). Notwithstanding the Mine's existing permits, as a direct result of Tribal Consultation, public comments received, and out of an abundance of caution, ADEQ decided to require an Individual APP permit that includes additional, enforceable protections. Through the Final Individual APP Permit, ADEQ is requiring the Permittee implement numerous environmental protections and engineering controls, which include:

- *A prohibition on mining activity in the zone of the C-aquifer*
- *Lining the Non-Stormwater Impoundment*
- *Lining the bottom 12 feet of the Mine shaft where water that collects in the Mine workings is required to be pumped back to the surface.*
- *Identification of and monitoring at a POC well(s) in accordance with A.R.S. § 49-244. The monitoring strategy, which is detailed in Section 2.5 of the Individual APP Permit, is designed such that in the unlikely event of a discharge, early detection can be achieved, and the Permittee can implement contingency measures to isolate and remedy the cause.*
- *Installation of at least three additional groundwater monitoring wells in the C-aquifer, a*
- *A requirement to conduct 30 years of post-closure monitoring, a*
- *A requirement that any water collected from the Mine shaft be treated to specific, protective standards before being used as dust control, and*
- *A requirement to assess the stability and geochemistry of mined areas to determine the risk of subsidence or long-term contamination.*

In conclusion, ADEQ determined that the combination of environmental protections, stakeholder engagement, and public involvement opportunities ensures fair treatment of people in surrounding communities and no disparate impacts. In addition, community concerns have not only been considered, they have also been acted upon in the decision-making process.

3.2.1.1. TRIBAL VALUES AND CONCERNS

Commenters expressed concerns that tribal historical and cultural resources are at risk of contamination from Mine operations.

ADEQ Response

ADEQ respects the Tribes' concerns for protecting their historical and cultural resources. To this end, before and during ADEQ's review of the Individual APP Permit application, it was important to ADEQ to dedicate and invest the time necessary to reach out to and offer formal Consultation with tribal leaders. This effort included:

- *ADEQ held a Leader to Leader meeting with the Havasupai Tribal Council at ADEQ on August 28, 2018.*
- *ADEQ reached out to all 22 Arizona Federally recognized Tribes in a letter dated May 19, 2021 requesting formal Consultation.*
- *ADEQ held a formal Consultation with the Havasupai Tribe virtually on July 12, 2021.*

- *ADEQ held another in-person Consultation on August 5, 2021 at Red Butte.*
- *ADEQ held a virtual Consultation on April 1, 2022.*

Based on ADEQ's discussions with tribal leaders, ADEQ conducted additional analysis and review. In addition, and out of an abundance of caution, permitting requirements were added in the Individual APP Permit, as well as additional requirements in the air quality permit for the Mine. These additional permit conditions and requirements work together to remove any reasonable probability of impacts beyond the Mine boundary.

The Forest Service record regarding cultural resources indicates that no cultural resources will be impacted by the construction and operation of the Mine.[40] *Additional information about the status of cultural resources can be found on the Forest Service website, including the Court of Appeals opinion which addresses subsequent cultural resource issues that have been raised since the Final Environmental Impact Statement (EIS) was issued in 1986.*[41]

ADEQ acknowledges that Red Butte has been identified as a potential eligible property for the national registry of historic places. Red Butte is 4 miles away from the edge of the facility boundary. The Individual APP Permit conditions require controls and operational practices that will ensure that any impacts are limited to the Mine boundary.

ADEQ's authority regarding cultural resources is limited to determining if any historic property will be substantially altered or diminished in the ADEQ permitted area, and then assuring that documentation and recordation is completed in that area.[42] *As stated in the Forest Service information, no cultural resources will be impacted in the area ADEQ is permitting. As part of the Forest Service review, documentation and recordation was previously completed for that area, because this is Forest Service land subject to federal historic preservation requirements.*

3.2.1.2. CONTAMINATION OF GROUNDWATER, CREEK, AND SPRINGS ON TRIBAL LANDS

Commenters expressed concerns that Havasu Canyon and Supai Village will be contaminated by uranium from mining operations at the Mine. A commenter stated the Mine, located less than 10 miles from the rim of the Grand Canyon, represents a serious threat to groundwater in the region and to the health and way of life of members of the Havasupai tribe.

ADEQ Response:

As part of the consideration of the Individual APP Permit, ADEQ conducted an extensive, comprehensive review of related environmental studies and permits, including the USFS EIS and ROD, USFS-approved facility Plan of Operations, engineering and hydrogeological reports, facility operations and inspections, ADEQ decisions, legal proceedings and public comments generated over the last 30 years. ADEQ professionals spent hundreds of hours conducting this comprehensive review. ADEQ reviewed these records and agrees with key conclusions that adverse impacts to groundwater from the Mine are extremely unlikely.

[40] See page 4.7 of https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5346657.pdf

[41] https://www.fs.usda.gov/detail/kaibab/home/?cid=fsm91_050263

[42] See A.R.S. § 41-863

In addition, the Individual APP Permit is designed to provide early detection of any potential groundwater contamination exceeding the permitted standards at the POCs. If ADEQ finds evidence that groundwater contamination is (or could be) occurring, the agency has the legal authority to require the installation of additional monitoring wells and corrective action.

3.2.2. PUBLIC HEALTH AND SAFETY

3.2.2.1. URANIUM CONTAMINATION

Commenters expressed concerns regarding public health and safety from uranium contamination in the following areas: the Grand Canyon, Utah, the surrounding area of the Mine, and areas beyond the Mine. Additionally, commenters made general comments with regards to uranium contamination.

Commenters expressed the concern that mining activities at the Mine will result in uranium contamination to the Grand Canyon. Commenters mentioned there are already water sources in the Grand Canyon that cannot be used due to uranium contamination. Commenters referred to a 2010 USGS Report indicating fifteen springs and five wells in the region contain concentrations of dissolved uranium that exceed the U.S. Environmental Protection Agency maximum contaminant level for drinking water.

Commenters expressed concerns for the communities surrounding the White Mesa Mill near Blanding, Utah being exposed to uranium contamination during the processing of uranium ore.

Commenters expressed concerns of detrimental impacts to landowners and potential contamination to groundwater in the surrounding area of the Mine. Additionally, commenters expressed concerns of uranium contamination to groundwater and safe drinking water in northern, central and southern Arizona. Commenters expressed concerns that major metropolitan areas of Phoenix and Tucson would be impacted by mining activities. Additionally, a commenter is concerned the water supply in Paulden, Chino Valley, and Prescott will be impacted by uranium contamination from the mining activities.

Commenters are concerned that radioactive materials will pollute groundwater, springs, and drinking water. Commenters mentioned the Gold King Mine release and the impact it had on three rivers. Commenters emphasized that water pollution is easier to prevent than to remediate. Commenters are concerned of mobilization of natural uranium and arsenic that otherwise would not be disturbed if left unmined.

Finally, commenters are concerned about the health effects from exposure to radon gas, long term ingestion of uranium in drinking water, and bioaccumulation of uranium in humans.

ADEQ Response:

Many of the commenters expressed concerns that are outside of the authority of the APP, such as radon gas exposure, bioaccumulation of uranium, and events that occurred outside of Arizona. As designed by Arizona Law, the APP regulates discharges of pollutants to Arizona's groundwater to protect groundwater quality. Regarding uranium in other areas of the Grand Canyon region being above drinking water MCLs, ADEQ notes that this Individual APP Permit is specific to the Mine. ADEQ recognizes that the Grand Canyon region is a naturally mineralized area, as noted by the USGS findings.

As part of the consideration of this Individual APP Permit, ADEQ initiated an extensive, comprehensive review of related environmental studies and permits, including the USFS EIS and

ROD, USFS-approved facility Plan of Operations, engineering and hydrogeological reports, facility operations and inspections, ADEQ decisions, legal proceedings and public comments generated over the last 30 years. ADEQ professionals spent hundreds of hours conducting this comprehensive review. ADEQ reviewed these records and agrees with key conclusions that adverse impacts to groundwater from the Mine are extremely unlikely.

In addition, the Individual APP Permit is designed to provide early detection of any potential groundwater contamination exceeding the permitted standards at the points of compliance. If ADEQ finds evidence that groundwater contamination is (or could be) occurring, the agency has the legal authority to require the installation of additional monitoring wells and corrective action.

3.2.3. RECREATION AND TOURISM

3.2.3.1. GRAND CANYON

Commenters expressed concerns of the location of the Mine in relation to the Grand Canyon. Additionally, commenters are concerned of impacts to recreational uses of the Grand Canyon and the availability of safe drinking water sources.

ADEQ Response

As designed by Arizona Law, the APP regulates discharges of pollutants to Arizona's groundwater to protect groundwater quality. As such, ADEQ does not have the legal authority to base permitting decisions on recreational impacts.

As part of the consideration of this Individual APP Permit, ADEQ initiated an extensive, comprehensive review of related environmental studies and permits, including the USFS EIS and ROD, USFS-approved facility Plan of Operations, engineering and hydrogeological reports, facility operations and inspections, ADEQ decisions, legal proceedings and public comments generated over the last 30 years. ADEQ professionals spent hundreds of hours conducting this comprehensive review. ADEQ reviewed these records and agreed with key conclusions that adverse impacts to groundwater from the Mine are extremely unlikely and will not impact the availability of safe drinking water sources in the region.

Furthermore, the Individual APP Permit is designed to provide early detection of any potential groundwater contamination exceeding the permitted standards at the POCs. If ADEQ finds evidence that groundwater contamination is (or could be) occurring, the agency has the legal authority to require the installation of additional monitoring wells and corrective action.

3.2.4. SOCIOECONOMICS

3.2.4.1. FOREIGN COMPANY

Commenters raised concerns that the Mine will only benefit foreign companies. Additionally, commenters are concerned that in the event of a spill or discharge a foreign corporation could declare bankruptcy to avoid any financial responsibility and leave behind contamination without remediation.

ADEQ Response

ADEQ does not have authority under the APP to make permitting decisions based on the nationality of an applicant. In order for an Individual APP Permit application to be processed from ADEQ, an applicant must be legally registered to do business in Arizona. The Permittee is registered with the Arizona Corporation Commission to do business in Arizona.

Any company, foreign or domestic, permitted through an Individual APP Permit is required to demonstrate that they have the financial capacity to operate and properly close the facility. Per A.A.C. R18-9-A203, a person applying for an individual permit must demonstrate financial capability to construct, operate, close, and ensure proper post-closure care of the facility in compliance with A.R.S Title 49, Chapter 2, Article 3. ADEQ requires a Financial Assurance Mechanism (FAM) in one of the forms listed in A.A.C. R18-9-A203(C) to cover the closure cost if the Permittee can attain clean closure as defined by A.R.S. § 49-201(5). If clean closure cannot be achieved, ADEQ requires the FAM to include the costs associated with post-closure activities until clean closure can be achieved. Please refer to the Contingency Plan, Financial Assurance/Bond, and Closure/Clean Closure Plan Sections for details.

The Mine FAM was demonstrated through A.A.C. R18-9-A203(C)(2) Performance Surety Bond, in accordance with A.A.C. R18-9-A203(B)(1) and through an existing bond payable to the USFS. The estimated dollar amount for facility closure and post-closure is $1,539,816.00. For additional information, refer to the Closure Plan/Clean Closure Plan Section and the Financial Assurance/ Bond Section.

3.2.4.2. ECONOMIC VIABILITY

Commenters expressed concerns that the Mine has not produced any uranium ore and has not been profitable for 35 years. Additionally, commenters raised concerns regarding the number of employees reported as 10 people in 2017 and 2 employees in 2019.

ADEQ Response

The APP solely regulates discharges of pollutants to groundwater to protect groundwater quality. ADEQ does not have the legal authority under the APP to base permitting decisions on the economic viability of mines or the number of employees hired by a company.

3.2.4.3. MINERAL RIGHTS

Commenters mentioned the 2012 Decision by the Secretary of the Interior for a 20-year temporary ban on uranium mining near the Grand Canyon and stated that due to this ban the Mine should be closed.

ADEQ Response

The decision by the Secretary of the Interior to suspend new mining claims near the Grand Canyon does not apply to valid existing mining claims. The Mine has a valid existing mining claim and is, therefore, unaffected.

3.2.5. TRANSPORTATION AND ACCESS

Commenters stated concerns regarding the transportation of hazardous materials, specifically uranium ore and radioactive water. A commenter expressed concern of the public being exposed to the dust from the uranium ore in the haul trucks during transportation. Additionally, commenters expressed concerns of the

haul trucks not being properly labeled or unmarked and that the public is not notified of transportation of hazardous materials.

ADEQ Response

ADEQ does not have authority under the APP to evaluate or regulate materials transport, including uranium ore. Comments related to transportation safety and emergency preparedness may be addressed by the Arizona Department of Transportation (ADOT).

In the Mine's air quality permit (Permit No. 88788), ADEQ included provisions to ensure the haul trucks will be sufficiently sealed with a tarp. The tarp will be lapped over the sides of the haul truck bed at least six inches and secured every four feet with a tiedown rope.

3.2.6. COMPLAINTS ABOUT ADEQ PROCESS

3.2.6.1. GENERAL PERMIT

Commenters stated the following concerns regarding the Mine's General Permits:

- The Mine structure itself, constant water pumping and on-site storage, and the contamination of the pumped water--preclude coverage under a General Permit and by the plain terms of General Permits, this underground uranium Mine fails to meet any of the types of activities that fall within this area of regulation. In moving forward with this Individual Permit process, ADEQ has recognized that a general permit is not appropriate for the Mine, and in any event, the Mine's discharge facilities ultimately do not fit within the confines of the types of facilities for which general permits are available.
- ADEQ cannot, as it has proposed in the draft permit, allow the unlawful General Permit to stay in place for the Mine under any event, including if there may end up being administrative and/or judicial appeals of the individual permit. In light of this, it is not clear how any activities are allowed to operate at the Mine at all while proper permit coverage is outstanding.
- Additionally, commenters expressed concerns of violations against the General Permits and the Permittee not being held accountable for violations.

ADEQ Response

ADEQ has determined that the existing General APP Permits meet all the applicable legal requirements. In addition, the USFS EIS and ROD, and USFS-approved facility Plan of Operations provide additional environmental protections. ADEQ is issuing this Individual APP Permit to:

- *Address public and Tribal concerns by including abundantly protective enforceable operating requirements,*
- *Consolidate the requirements of the three General APP Permits,*
- *Clarify the elevations at which mining activity will occur, and*
- *Specify the post-closure monitoring requirements.*

Under A.R.S. § 41-1092.11.A, since the Permittee made a timely application for renewal of its General APP Permit, that permit remains effective until a final determination is made by ADEQ on the Individual APP Permit, or until any and all appeals from that decision are final.

ADEQ has a compliance and enforcement function to ensure permit holders comply with all environmental protection permits and regulations. ADEQ performs regular inspections of all permitted facilities, as well as inspections in response to complaints. Additionally, permits require the permit holder to monitor environmental parameters, keep appropriate records, and make regular reports to ADEQ, which are reviewed to ensure compliance. The Mine was last inspected on April 14, 2021, and the Permittee was in compliance with its General Permits at the time of inspection.

3.2.6.2. PUBLIC COMMENT PERIOD

A commenter expressed concern that the public trying to comment on the permit have been receiving error messages when submitting their comments through the ADEQ link and that given these issues with the submission form, that ADEQ extend the public comment period one week.

ADEQ Response

ADEQ is required to hold a public comment period for a minimum of 30 days. The public comment period on the proposed Individual APP Permit was 45 days from June 23, 2021 to August 7, 2021. A virtual public hearing was held on August 9,2021 and ADEQ allowed any participants, who did not state their entire verbal comments, to email their comments to PinyonPlainAPP@azdeq.gov by midnight of August 9, 2021.

ADEQ received only one notification about error messages and ADEQ staff emailed the commenter to address this issue on August 9, 2021. ADEQ determined that an extension of the public comment period beyond 45 days was not warranted.

3.2.6.3. TRANSPARENCY

Commenters expressed concerns regarding the transparency of the following:

TRANSPARENCY OF THE NAME OF THE MINE

Commenters asserted the name change of the Mine from Canyon Mine to Pinyon Plain Mine was a public relations move and that ADEQ should refer to the Mine with its previous name.

ADEQ Response

ADEQ does not have authority under the APP to regulate facility names or name changes. The name change has no impact on the scope of the Individual APP Permit.

TRANSPARENCY OF CONVERSATIONS

Commenters requested transparency for disclosure of conversations between ADEQ and the Permittee.

ADEQ Response

*Arizona Revised Statutes Title 39, Chapter 1 and A.R.S. § 49-205 require ADEQ to maintain public records and make them available for public inspection. Any member of the public may submit a public records request through the Records Center at ADEQ (*https://www.azdeq.gov/records-center*) to request any documents, data, communications or other items relating to the Individual APP Permit.*

TRANSPARENCY OF DATA AND VIOLATIONS/ EXCEEDANCES

Commenters expressed concerns over the lack of transparency of sampling and monitoring data. A commenter suggested the permit needs to require that any and all sampling and monitoring data, including notification of violations and/or exceedances, are swiftly provided to ADEQ, and that it is not enough that the draft permit requires the Permittee to merely maintain this data. The commenter asserted that the Permittee is not required to provide this information to ADEQ.

ADEQ Response

Section 2.7.3- Permit Violation and Alert Level Status Reporting of the permit requires the Permittee to report any AL exceedance, or violation of any permit condition, AQL, or DL within 5 days of becoming aware. This reporting requirement is standard for all Individual APP Permits per A.A.C. R18-9-A207.A. In addition to notifying ADEQ of any exceedance or violation, the Permittee must submit a written report per A.A.C. R18-9-A207.B that describes the cause of the violation and the actions being taken to mitigate or eliminate the violation. Furthermore, although it is not required for ambient groundwater monitoring data to be submitted until completion of the ambient groundwater monitoring report, ADEQ has authority to request these records at any time.

TRANSPARENCY OF REQUIREMENTS TO ISSUE AN INDIVIDUAL APP PERMIT

Commenters asserted that ADEQ cannot lawfully issue an Individual APP Permit because it will not be possible for the Permittee to demonstrate that "pollutants discharged will in no event cause or contribute to a violation of aquifer water quality standards" or that "no pollutants discharged will further degrade . . . the quality of an aquifer that at the time of the issuance of the permit violates aquifer quality standard for that pollutant."

ADEQ Response

The Permittee has demonstrated under A.R.S § 49-243.B.1, that their facilities will be designed, constructed and operated to ensure the greatest degree of discharge reduction achievable through application of the best available demonstrated control technology (BADCT) and under A.R.S. § 49-243.B.3, that no pollutants discharged will further degrade any aquifer at the applicable POCs that at the time of the issuance of the permit violates the AWQS for that pollutant.

TRANSPARENCY OF PERMIT REVOCATION

A commenter asked "if the department feels that there's no choice, but to issue the permit for the Mine, could the department issue the permit, then revoke it under different standards?"

ADEQ Response

ADEQ's authority to revoke an Individual APP Permit can be found in A.A.C R18-9-A21, which detail the circumstances which allow ADEQ to take action resulting in revocation, denial, or termination of the Individual APP Permit.

TRANSPARENCY OF CLAIMED MISSING INFORMATION IN THE DRAFT PERMIT THAT WOULD NOT UNDERGO A PUBLIC COMMENT PERIOD

Commenters expressed concerns that the draft permit was missing information, ranging from ambient groundwater data to numeric ALs and at least four discharging facilities beyond those identified in the draft permit. "Some, like ambient groundwater data and numeric ALs, are proposed to be set at some

later point in time and apparently would never undergo public review, the former of which would also be the case for the enhanced evaporation system." Commenters suggested that ADEQ has shielded this information from public review and comment.

ADEQ Response

Arizona Revised Statutes Title 39, Chapter 1 and A.R.S. § 49-205 require ADEQ to maintain public records and make them available for public inspection. Any member of the public may submit a public records request through the Records Center at ADEQ, https://www.azdeq.gov/records-center*, to request any documents, data, communications or other items relating to the Pinyon Plain Mine Individual APP Permit.*

This permit requires ambient monitoring for the R-aquifer and the C-aquifer, with ALs and AQLs to be established at the end of the ambient monitoring period. Per A.A.C. R18-9-A211.D.2.h, the calculation of an AL, AQL, or other permit limit based on monitoring subsequent to permit issuance constitutes an Other Amendment, which does not require public participation. However, as mentioned above, the public may request the data through ADEQ's Records Center. For additional information on this matter, refer to the Groundwater Monitoring Section of this Responsiveness Summary.

ADEQ'S MISSION

Commenters asserted that ADEQ is not fulfilling its mission "to protect and enhance public health and the environment" if this permit is issued.

ADEQ Response

ADEQ's mission is broad and important; ADEQ's legal authorities, on the other hand, are specific and limited in law. Use of ADEQ's general mission language to critique a specific decision without considering the relevant statutes that govern that decision is to misunderstand the law and/or our representative form of government. The APP statute is designed to ensure that groundwater exceeding permitted standards does not occur at or beyond the POC. The APP binds a facility to permit requirements and requires that BADCT is implemented and monitoring is conducted regularly. Furthermore, permitted facilities are necessarily inspected and required to provide FAM to properly close a facility.

Lastly, the APP requires post-closure monitoring in certain cases. All these specific protections included in the APP statute are how ADEQ is to fulfill its mission. The APP statute also states clearly that ADEQ "shall" issue a permit when applicants meet specific criteria. Had the legislature desired to make this discretionary for ADEQ, the statute would use "may" instead of "shall".

3.3. LIST OF DISCHARGING FACILITIES

Commenters opined that underground mine facilities were discharging facilities, that ADEQ was required to regulate as such in the permit, which included: main shaft, ventilation shaft, breccia pipe, enhanced evaporation system, and mine workings.

ADEQ Response

A.R.S. § 49-241(A) requires "...any person who discharges or who owns or operates a facility that discharges shall obtain an aquifer protection permit from the director."

For purposes of the aquifer protection permit program, "discharge means the addition of a pollutant from a facility either directly to an aquifer or to the land surface or the vadose zone in such a manner that there is a reasonable probability that the pollutant will reach an aquifer"(A.R.S. § 49-201.12).

Proposed Mine Workings Between the C-Aquifer and the R-Aquifer

The final Individual APP Permit has been modified to clarify that mining activity in the zone of the C-aquifer will not occur. As revised, the final Individual APP Permit limits the Permittee's mining activity to the area between the C-aquifer and the R-aquifer. The underground facilities at the Mine that will operate below the C-aquifer and above the R-aquifer do not constitute discharging facilities as defined in A.R.S. § 49-201.12. There is no reasonable probability that the Permittee's mining activities will add a pollutant directly to either the C-aquifer or the R-aquifer. Approximately 873 feet of separation exists between the lowest proposed Mine workings and the top of the R-aquifer. This area of separation includes multiple rock formations, including the Hermit Shale, the Upper Supai, the Lower Supai, the Redwall Limestone and the Temple Butte Limestone, all of which provide a natural barrier that prevents pollutants from reaching the R-aquifer below. In addition, the Permittee has lined the bottom 12 feet of the Mine sump to provide an extra layer of protection for the R-aquifer. See section 3.1.1.3, subsection Downward Vertical Gradient for a detailed discussion of the hydrology of the geologic materials separating the C-aquifer and R-aquifer.

Enhanced Evaporation System

Due to its design, the Enhanced Evaporation System located within the lined Non-Stormwater Impoundment does not meet the definition of a discharging facility. The Enhanced Evaporation System directs mist downward toward the impoundment surface, which greatly limits the possibility that any water droplets or mist will travel beyond the impoundment enclosure. Unlike traditional land based systems, the Enhanced Evaporation System is installed near the center of the impoundment and takes into consideration prevailing wind speeds and direction. Consequently, in the unlikely event that any mist or droplets travel beyond the impoundment, the quantity would be so insignificant that it would not create a reasonable probability of a pollutant reaching an aquifer.

3.3.1. BADCT INSUFFICIENT

TECHNICAL REQUIREMENTS FOR BADCT

Commenters stated that the permit does not meet the technical requirements for BADCT under A.A.C. R18-9-A202, including properly defining the discharge impact area, because the breccia pipe, Mine shaft, ventilation shaft, and enhanced evaporation system have not been identified as discharging sources in the Individual APP Permit. Commenters further expressed concern that the BADCT is based on a false premise that there is no connection between the C- and R-aquifer so cannot be achieved per statute which requires "the facility will be so designed, constructed and operated as to ensure the greatest degree of discharge reduction achievable through application of the best available demonstrated control technology, processes, operating methods or other alternatives, including, where practicable, a technology permitting no discharge of pollutants."

ADEQ Response

As discussed in the Discharging Facilities Section of this Responsiveness Summary, the breccia pipe, Mine shaft, ventilation shaft, and enhanced evaporation system are not discharging facilities. As such, these facilities are not subject to the requirements under A.R.S. § 49-243 nor is it applicable to A.R.S. § 49-244 or A.A.C. R18 9-A202. ADEQ disagrees with the assertion that the Individual APP Permit is based on a false premise that there is no connection between the C

and the R aquifers. For additional information on this matter refer to the Groundwater Movement Section of this Responsiveness Summary.

MINE SHAFT UNLINED PORTION

Commenters raised concerns that the unlined portion of the Mine shaft is a discharging facility as it could be exposed to water during an equipment failure or power outage.

ADEQ Response

As discussed, the Mine shaft, including the lined portion of the Mine sump, does not meet the definition of discharge. However, in order to address commenters' concerns regarding this issue, the Permittee is required to have a backup pump available for replacement in the event of a temporary pump malfunction to ensure that water levels in the shaft are maintained at the appropriate level and will not exceed the lined portion of the sump. Additionally, a ball float sensor connected to a visual and audible alarm will be set at the top of the lined sump to alert the Permittee in the event of a pump system malfunction that causes the water level to reach the top of the lined sump. Pump repairs will be made as soon as practicable to reduce the amount of time the water may be in contact with the unlined portion of the shaft. Due to the low permeability of the rock near the bottom of the shaft, and the hundreds of feet of low-permeability rock between the C-aquifer and the R-aquifer, ADEQ has determined the probability of impacts to water quality (in the event of a temporary pump failure) is remote.

REQUIREMENTS UNDER A.R.S. § 49-243(I)(1)

Commenters raised concerns that the draft permit does not address the requirements in A.R.S. § 49-243(I)(1) which requires that the Mine "must limit discharges to the maximum extent practicable regardless of cost: (1) for any organic substance listed by the secretary of the department of health and human services pursuant to 42 [U.S.C.] § 241(b)(4), as known to be carcinogens or reasonably anticipated to be carcinogens." Commenters state that arsenic is subject to this section, which has been identified in water samples pumped from the Mine shaft.

ADEQ Response

A.R.S. § 49-243(I)(1) is only applicable to organic substances. Arsenic is inorganic and therefore not subject to this section.

EXTENT AND DEGREE OF KNOWN SOIL CONTAMINATION

Commenters raised concerns that the Permittee did not provide ADEQ with documentation of the extent and degree of known soil contamination at the Mine (including within the Mine perimeter fence and just outside the fence).

ADEQ Response

Under A.A.C. R18-9-A202(A)(8)(b)(vii), ADEQ may require documentation of the known extent of soil contamination based on an assessment of the quantity and characteristics of pollutants discharged, methods of disposal, and site conditions. As mining activities have not yet begun at the Mine, and no discharges have occurred, ADEQ is not requiring the Permittee to provide items detailed under A.A.C. R18-9-A202(A)(8)(b)(vii).

3.4. OPERATIONAL CONCERNS

3.4.1. ENHANCED EVAPORATION SYSTEM

Commenters expressed concern that the mist generated by the enhanced evaporation system may drift outside the lined Non-Stormwater Impoundment and impact the surrounding vegetation.

Additionally, commenters expressed concerns that the enhanced evaporation system should be required to have wind speed monitoring and equipment maintenance for such monitoring and reporting to ADEQ, and that the permit must impose a cap for persistent and wind gust speeds that, if met, requires immediate cessation of the operation of the enhanced evaporation system.

ADEQ Response

The newly installed APEX 2.0 enhanced evaporation system currently authorized to operate in the lined Non-Stormwater Impoundment is designed to ensure that mist droplets remain within the Impoundment area and do not migrate beyond its footprint. This is accomplished through the system design by which the targeted spray is emitted closer to the pond surface thus ensuring that droplets do not travel beyond the lined Non-Stormwater Impoundment. Furthermore, in contrast to land based enhanced evaporation systems, the APEX units are required to be installed within the Non-Stormwater Impoundment, and anchored in place such that the likelihood of any droplet traveling beyond the impoundment is very low. As part of the air quality permit renewal for the Mine (Permit No. 88788), these APEX systems are required to be installed and operated in accordance with the manufacturer's specifications. These specifications require the system to be installed appropriately and maintained on an annual basis. Additionally, as an extra measure of caution, the air quality permit requires the Mine to conduct soil sampling and gamma radiation monitoring around the Mine.

3.4.2. USE OF NON-STORMWATER IMPOUNDMENT WATER FOR DUST CONTROL

Commenters raised concern over the use of water from the lined Non-Stormwater Impoundment as use for dust control. A Commenter also noted that the Plan of Operations requires that all excess water be retained in holding ponds and be treated on-site.

ADEQ Response

The Individual APP Permit requires that water from the lined Non-Stormwater Impoundment be treated to meet 0.05 mg/L for arsenic and .03 mg/l for uranium prior to use as on-site dust control. The Permittee is required to comply with both the Individual APP Permit as well as the USFS Plan of Operations.

3.4.3. WILDLIFE

Commenters expressed concerns of wildlife accessing the Mine and the lined Non-Stormwater Impoundment.

ADEQ Response

The APP, as designed by state law, solely regulates discharges of pollutants to groundwater to protect water quality, and does not have the legal authority to require the Permittee to include

measures to prevent access by wildlife. Furthermore, under A.R.S. § 41-1030(B), ADEQ shall not base licensing (permitting) decisions on requirements or conditions that are not specifically authorized by rule or statute. Nonetheless, the Permittee has taken steps to minimize the potential for wildlife and the public to enter the Mine by constructing and maintaining fencing that encompasses the entire Mine boundary.

3.4.4. WATER MANAGEMENT

Commenters raised concerns regarding the amount of water being pumped out of the Mine shaft.

ADEQ Response

As designed by state statute, ADEQ's APP regulates the discharge of pollutants to aquifers to protect groundwater quality. The program does not have authority to regulate groundwater withdrawal or dewatering activities. For additional information on this matter, refer to the Groundwater Quantity Section of this Responsiveness Summary.

3.4.5. MINE FLOODING

Commenters expressed concerns that water entering the Mine shaft may flood and potentially impact groundwater. Commenters also stated that seeps into the Mine shaft should be sealed.

ADEQ Response

The Individual APP Permit requires the Permittee to ensure that any water entering the Mine shaft collected in the lined sump to be pumped to the lined Non-Stormwater Impoundment or water tank as applicable. In addition, the Permittee is required to have a backup pump available for replacement in the event of a pump malfunction to ensure that water levels in the shaft are maintained. A ball float sensor connected to a visual and audible alarm will be set at the top of the lined sump to alert the Permittee in the event of a pump system malfunction that causes the water level to reach the top of the lined sump. Due to the low permeability of rock near the bottom of the shaft, the short periods of time duration of a possible overtopping of the lined sump, and the hundreds of feet of low-permeability rock that overtop the R-aquifer, ADEQ has determined that any impact to water quality is unlikely. Sealing seeps during active mining is not practical and not required based upon the reasoning above.

3.5. CONTINGENCY PLAN

Commenters raised concerns that the draft permit's contingency plan does not define the actions to be taken in the event of a discharge, if a discharge results in any of the following:

1. A violation of an AWQS or an AQL,
2. A violation of a discharge limitation,
3. A violation of any other permit condition,
4. An AL is exceeded, or
5. An imminent and substantial endangerment to the public health or the environment.". Commenters also expressed concern that delays between ADEQ and the Permittee over approval of a contingency action could create a delay in responding to a discharge event.

ADEQ Response

The Individual APP Permit requires the Permittee to submit a contingency plan that meets the requirements of A.A.C. R18-9-A204. The Contingency Plan submitted by the Permittee is located within the Individual APP Permit application, Section 6, which can be viewed on ADEQ's website at https://azdeq.gov/PinyonPlainMineAZPermitting.

The contingency plan requirements under A.A.C. R18-9-A204 requires the Permittee to define the actions to be taken in the event of a discharge that meets A.A.C. R18-9-A204(A)(1) through (5). ADEQ reviewed the submitted contingency plan and determined that it meets all requirements set forth in A.A.C. R18-9-A204, which includes actions required of the Permittee if triggered. The plan provides a framework for corrective action measures to be implemented in the event that a discharge results in any violation detailed in A.A.C. R18-9-A204(A)(1-5).

Despite any perceived delays associated with the implementation of corrective actions associated with A.A.C. R18-9-204(B)(8), ADEQ ensures that responses and corrective action approvals associated with permit violations and exceedances will be done in an expeditious manner.

3.6. CLOSURE PLAN / CLEAN CLOSURE PLAN

Commenters expressed concern regarding the efficacy of utilizing the existing clean closure plan approved by the USFS for the Individual APP Permit. Commenters also raised concerns that the closure plan lacks long-term post-closure monitoring and at the time of its development did not consider current conditions at the Mine such as seepage rates in the Mine shaft and concerns for the potential of Mine subsidence.

ADEQ Response

Closure and Post-Closure Plan

To resolve the commenters' concerns, ADEQ has determined that post-closure monitoring for 30 years after mining operations have ceased is required in order to be protective of groundwater quality. The Permittee is required to monitor water quality for all the parameters in Table 9 of the Individual APP Permit to assess geochemical conditions at the POC wells during the 30-year post-closure monitoring period. If during the post-closure period it is discovered that there is a potential for contamination from the Mine, the Permittee is required to propose a plan for ADEQ's review to remove or neutralize the potential contamination source. If ADEQ cannot reach an agreement with the Permittee on the course of action to remove or neutralize a potential source of contamination, the issue shall be referred to ADEQ's Compliance and Enforcement Section for further action. ADEQ's Compliance and Enforcement Section has the authority to implement a voluntary or mandatory course of action that ADEQ determines to be necessary to protect public health and the environment.

Closure/Post-closure period

An APP-regulated facility cannot terminate (release) its permit, and be relieved of its obligations under the Individual APP Permit until all potential sources of pollutants have been removed, mitigated, or chemically stabilized. If during the post-closure monitoring period it is discovered that chemical stabilization has not been achieved, ADEQ may require additional permanent closure actions, after which a new post-closure monitoring period will commence. As noted, the Individual APP Permit requires a 30-year post-closure monitoring period.

BACKFILLING THE SHAFT WITH EXCAVATED DEVELOPMENT ROCK AT CLOSURE

Commenters expressed concern that the return of rock materials removed from the underground Mine may be used as fill materials for the shafts.

ADEQ Response

Stockpiled rock material excavated from the main shaft and vent shaft will be backfilled as described in the Clean Closure Plan in the Individual APP Permit application (Volume III, Appendix H). The rock material excavated from the main shaft and vent shafts are exempt from APP permitting.

State law, A.R.S. § 49-250(B)(5), exempts "mining overburden returned to the excavation site including any common material which has been excavated and removed from the excavation site and has not been subjected to any chemical or leaching agent or process of any kind" from APP Permit requirements.

3.7. FINANCIAL ASSURANCE / BOND

3.7.1. ENTITY HOLDING FINANCIAL ASSURANCE MECHANISM (FAM)

Commenters expressed concern that the FAM is held by the Permittee and not ADEQ. Additionally, commenters expressed concern that the costs were not calculated using USFS Guidance, and were not based on third party estimates.

ADEQ Response

ADEQ's authority under A.R.S. § 49-243(N)(3) requires an applicant to "…demonstrate financial responsibility to cover the estimated costs to close the facility and, if necessary, to conduct post-closure monitoring and maintenance…". The FAM amount for the Mine is provided in the form of a surety bond and is held by the USFS and ADEQ, and has been determined by ADEQ to be adequate to conduct closure/post closure activities detailed in the approved closure/post-closure plan. ADEQ and the USFS have access to the FAM amount if required.

In a March 10, 2021 letter from the USFS to the Permittee[43] , the USFS confirms that the "cost estimate conforms to USFS guidance for reclamation bond estimation and is therefore acceptable."

3.7.2. REQUIRE GROUNDWATER REMEDIATION COSTS IN BOND

GROUNDWATER CONTAMINATION COST ESTIMATE

Commenters stated the FAM should also be able to cover the possibility of subsurface water contamination.

ADEQ Response

Arizona law requires that cost estimates for the FAM be based on estimates for facility construction, operation, maintenance, closure, and post-closure activities. This calculated amount does not include costs to address the unlikely event that groundwater contamination occurs. As such, ADEQ does not have the authority to require additional closure amounts beyond what is anticipated to occur during the life cycle of the operation of the Mine. However, it is

[43] Provencio, Heather, USFS Forest Supervisor, Letter to Scott Bakken (EFRI), 10 March 2021.

worth noting that under the Individual APP Permit and Compliance Schedule Items 1 and 2, the Permittee is required to update cost estimates of their FAM every six years to account for inflation factors and any changes to Mine conditions impacting closure/post-closure plans.

3.8. DRAFT PERMIT CRITICISMS AND SUGGESTIONS

Commenters expressed the following criticisms and suggestions on the draft permit:

COMPLIANCE WITH AWQS

A commenter asserted ADEQ cannot issue the permit as it stands and be compliant with its duties and requirements to protect the environment and ensure compliance with aquifer water quality standards.

ADEQ Response

Based on ADEQ's review of the Individual APP Permit application, ADEQ determined that the Mine meets the statutory and regulatory requirements under the APP and the Individual APP Permit includes all legal requirements to ensure compliance with applicable AWQS.

HYDROLOGIC STUDY

A commenter asserts that the draft permit is not compliant with the law because it does not reflect the most current science as to the hydrogeological connections of the area. According to A.A.C. R18-9-A202 "The hydrologic study that defines the discharge impact area must accurately represent current hydrologic conditions."

ADEQ Response

ADEQ has reviewed the hydrogeologic report provided in the Individual APP application as well as recent peer-reviewed scientific literature and data collected by the Permittee and USGS Reports. Additional sources are cited in footnotes within the various topic sections and subsections in this responsiveness summary document where they apply. Based upon this evaluation ADEQ has determined the requirements under A.A.C. R18-9-A202 have been met.

DISCHARGE IMPACT AREA (DIA)

A commenter asserted that the permit application and the draft permit cannot properly identify the discharge impact area of the Mine because it is based on inaccurate hydrogeologic conditions and thus cannot make the required demonstration that the discharging facilities at the Mine "will not cause or contribute to a violation of an Aquifer Water Quality Standard at the applicable point of compliance."

ADEQ Response

The DIA is defined in statute (A.R.S. § 49-201) as "...the potential aerial extent of pollutant migration, as projected on the land surface, as the result of a discharge from a facility." For this Mine, there will be no unauthorized aerial extent of pollution migration as the only discharging facilities on-site are the non-stormwater impoundment, development rock stockpile, and intermediate ore stockpile. These facilities, as part of BADCT, require liners to ensure there will be no reasonable potential to impact an aquifer. As a result, the DIA in this case equals the pollution management area (PMA), which can be seen on the site plan Figure 3.A within the Individual APP Application Volume II, Appendix A.

NOT RELYING ON CURRENT SCIENCE AND LACK OF PEER-REVIEWED CONSENSUS

A commenter expressed concerns of foundational errors in the permit have resulted in a cascade of analysis and requirement shortfalls. These assertions of foundational errors include the underlying assumptions made as to the site-characteristics and the subsequent failure of the application and draft permit to be reflective of, and apply, peer-reviewed and scientific consensus.

Additionally, a commenter stated that there appears to be a large body of evidence that would suggest inaccuracies in the current available data regarding the Mine and its current permit, review of new data should certainly be made before making a decision that could affect human & animal health, and the local and state economy that could all be threatened if the Mine were allowed to proceed.

ADEQ Response

As part of the consideration of this Individual APP Permit, ADEQ initiated an extensive, comprehensive review of related environmental studies and permits, including the USFS EIS and ROD, USFS-approved facility Plan of Operations, engineering and hydrogeological reports, facility operations and inspections, ADEQ decisions, legal proceedings and public comments generated over the last 30 years. ADEQ professionals spent hundreds of hours conducting this comprehensive review. ADEQ reviewed these records and agrees with key conclusions that adverse impacts to groundwater from the Mine are extremely unlikely.

UNIDENTIFIED WELLS

A commenter expressed concerns that not all wells in the area have been previously identified, and that impacts to these wells are not considered in ADEQs review.

ADEQ Response

ADEQ's review of this application considered the updated well inventory within approximately 20 miles of the Mine..[44] This information is included in the hydrogeologic report provided in the Individual APP application Volume II, Appendix A. ADEQ considers the well dataset to be robust

The Individual APP Permit requires that AQLs must be met at the POC and demonstrate protection of downgradient wells within the region. In addition, the permit enhancements include the installation of three additional wells to monitor the C-aquifer.

ASSERTION THAT ARIZONA RULE AND STATUTE REQUIREMENTS ARE NOT MET

COMMENTS RELATED TO A.R.S § 49-104.A.1, 49-241, AND 49-252

A commenter asserted that to comply with its core statutory duty to "protect the environment" under A.R.S. § 49-104 (A)1 and A.R.S. § 49-241 to 49-252, ADEQ's Pinyon Plain Mine Individual Aquifer Protection Program Permit cannot be issued as proposed, but instead must: Transition this Individual APP Permit to require immediate closure, remediation, mitigation, monitoring, and post-closure maintenance activities.

ADEQ Response

ADEQ disagrees. As part of the permitting process, ADEQ consults with counsel before making permitting decisions when there are legal questions. Not only are the existing General Permits lawful and protective, the Individual APP, which consolidates the existing General Permits, will provide additional enhancements and is abundantly protective.

A.R.S. § 49-243.B states that "The director shall issue a permit to a person for a facility other than water storage at a storage facility pursuant to title 45, chapter 3.1 if the person demonstrates that either paragraphs 1 and 2 or paragraphs 1 and 3 of this subsection will be met…" Review of the Individual APP permit application and the extensive historic hydrogeologic record coupled with the abundantly protective permit conditions meet the requirements A.R.S. § 49-243.B.

A.R.S § 49-104.A.1 requires that ADEQ "Formulate policies, plans and programs to implement this title to protect the environment." ADEQ has fulfilled that statute in part by establishing the Aquifer Protection

[44] The hydrogeologic report provided in the Individual APP application Volume II, Appendix A includes Figure 10 which is a map of existing wells penetrating the C-aquifer sandstone. ADEQ's review considered these well locations.

Program in Arizona Administrative Code, Title 18, Chapter 9, Articles 1, 2 and 3. The Individual Permit is consistent with both statute and rule. ADEQ has determined that the existing APP General Permits for the Mine are lawful and protective. The Individual APP, which consolidates the existing General Permits and includes additional enhancements, is also lawful and protective.

COMMENTS RELATED TO A.R.S. §49-243

A commenter stated that, according to A.R.S. § 49-243(K)(8), ADEQ "shall consider and may prescribe in the permit . . . terms and conditions as the director deems necessary to ensure compliance with [the aquifer protection program]." "Given that the water both above the mine shaft and underground is posing life threatening conditions by exposing people and animals to radioactivity and heavy metals, and given that we cannot know with absolute certainty that the underground water systems are not being contaminated, I strongly support the immediate closure of Pinyon Plain Mine, and urge ADEQ to require remediate and monitor the damage already done."

ADEQ Response

ADEQ has determined that the Mine does not pose life threatening conditions to people and animals. The commenter provided no evidence to support the assertion that the Mine is posing a life-threatening condition. The APP is designed to meet ADEQ's mission to protect public health and the environment by ensuring that groundwater exceeding permitted standards does not occur at or beyond the POC in accordance with applicable statute and rule. The APP, as designed by state law, regulates and imposes requirements on discharges of pollutants to groundwater to protect water quality.

ADEQ is required by law to issue an Individual APP Permit to an applicant if all requirements in statute and rule are met. "Absolute certainty" is not the threshold established in law. ADEQ has determined that all statute and rule requirements have been met for the Mine.

A commenter stated, "the factual and legal problems with the draft permit are systemic and the risks to aquifers too high for ADEQ to issue the draft permit. Moreover, from the information and data that is currently available, even if the draft permit was modified, but would still permit mining to move forward, such a permit would not meet all legal requirements necessary for issuance. As discussed extensively, if mining operations were to move forward, it would result in further Mine shaft sinking and development, including actual mining of the breccia pipe, and due to the serious discharge ramifications of such activities, such a permit is foreclosed because it cannot be determined for such a permit that, pollutants discharged will in no event cause or contribute to a violation of aquifer water quality standards at the applicable point of compliance or, that no pollutants discharged will further degrade at the applicable point of compliance the quality of any aquifer that at the time of issuance of the permit violates the aquifer quality standard for that pollutant."

Additionally, a commenter asserted that given the magnitude of problems with the draft permit and its underlying analysis, including numerous fatal misrepresentations and omissions of relevant science and information, ADEQ must subject any future iterations of a draft permit to renewed public comment and review in order to ensure public transparency and satisfy relevant requirements in Arizona statute.

ADEQ Response

ADEQ is required by law to issue an Individual APP Permit to an applicant if all requirements in statute and rule are met. ADEQ has determined that all statutory and regulatory requirements have been met to issue an Individual APP Permit for the Mine.

Commenters asserted that the plain language of A.R.S. § 49-243(B) makes clear that the Permittee does not meet the standard and issuance would be discretionary. In more detail, the commenters stated that "it is

entirely untenable for the Permittee to suggest, or for ADEQ to affirm, that pollutants discharged will in no event cause or contribute to a violation of aquifer water quality standards at the applicable point of compliance." Commenters stated that "ADEQ simply does not have enough data to make this finding." Commenters indicated that data is still outstanding to determine current water quality standards at the Mine, and the science supporting the Permittee's assertions relating to hydrogeologic conditions underneath the Mine have been questioned-if not refuted-in the scientific community. Commenters also allege that more recent science is not wholly congruent with the data the Permittee directs ADEQ toward, or that there are real possibilities that future activities related to the R-aquifer can have a substantial impact on groundwater flow and hydrological connectivity of the C-aquifer and R-aquifer, is the precise reasons why Permittee falls well short of meeting the standard laid out in statute.

ADEQ Response

Through the studies and documentation provided in the Individual APP Permit application, the Permittee has demonstrated that any discharge will not cause or contribute to a violation of AWQS at the POC. The applicable standard in 49-243(B) is not "zero release". Rather, the statute requires that activities undertaken will not result in a violation of the AWQS at a POC. The Permittee has made this demonstration. This standard is further protected by the required, ongoing monitoring at the POC wells.

As discussed throughout this Responsiveness Summary, ADEQ has reviewed and considered the most recent science and data available. ADEQ finds it has adequate data and is requiring controls and monitoring sufficient to mitigate the identified risks. The Individual APP Permit requires the Mine to gather a minimum of 10 rounds of ambient groundwater monitoring data to establish the current water quality in the C- and R-aquifers, which is a standard requirement of Individual APP Permits, to ensure that a baseline of water quality is known before mining activity occurs.

A commenter asserted that the Permittee's permit application fails to meet the standards set forth in A.R.S. § 49-243(B)(2) and (B)(3), and that issuance of a permit to the Permittee is discretionary.

ADEQ Response

Through the studies and documentation provided in the Individual APP Permit application, the Permittee has demonstrated that any discharge will not cause or contribute to a violation of AWQS at the POC. The applicable standard in 49-243(B) is not "zero release". Rather, the statute requires that activities undertaken will not result in a violation of the AWQS at a POC. The Permittee has made this demonstration. This standard is further protected by the required, ongoing monitoring at the POC wells

As discussed throughout this Responsiveness Summary, ADEQ has reviewed and considered the most recent science and data available. ADEQ finds it has adequate data and is requiring controls and monitoring sufficient to mitigate the identified risks. The Individual APP Permit requires the Permittee to gather a minimum of 10 rounds of ambient groundwater monitoring data to establish the current water quality in the C- and R-aquifers, which is a standard requirement of Individual APP Permits, to ensure that a baseline of water quality is known before mining activity occurs.

A commenter claimed that the Permittee fails to understand the standard announced in A.R.S. § 49-243(B)(2), the Permittee claims that "in the unlikely event of a release, the facility would not violate [Aquifer Water Quality Standards ("AWQS")] at the [Point of Compliance ("POC")]." The commenter also claims, the statue is clear that the standard is "in no event," not the Permittee's conjured standard of "in the unlikely event." The commenter continues to state that "EFRI's misunderstanding is further evidenced by its belief that a release from the Mine is permissible under the standard so long as it is not the sole cause of an AWQS violation. The statute is more stringent and requires that such a release not "contribute" to a violation. Furthermore, the word "contribute" is not tempered or modified by surrounding language; a release that

contributes by the smallest degree to an AWQS fails to meet the standard. Even more alarming is that DEQ also misstates this standard in the Permit." The commenter concluded that it is difficult to meet a standard one does not understand, and for the following reasons, the Permittee's application fails to meet A.R.S. §49-243(B)(2).

ADEQ Response

The Permittee's choice of words, specifically "in the unlikely event", is not relevant to ADEQ's analysis of whether the Individual APP Permit meets the standards set forth in A.R.S § 49-243. ADEQ has determined that the Individual APP Permit meets A.R.S. § 49- 243(B)(2) utilizing the presumptive controls defined within A.R.S. § 49- 243(B)(1) and allowed under A.R.S. § 49- 243(D).

A commenter stated that "it could be argued that the plain statutory language in A.R.S. § 49-243(B) creates a near unreachable standard for a uranium mine operator." The commenter indicated that this alone is not a permissible legal justification for approving a permit that does not comply with the statute. The commenter stated that "this standard applies to all facilities, other than water storage facilities, who apply for an individual aquifer protection permit. Other facilities have met this standard and have been issued individual aquifer protection program permits, primarily because those facilities do not present the same dangers to an underground water aquifer that a uranium mine does. There may be locations in Arizona where uranium ore deposits do not rest above an aquifer that serves as the sole water source for thousands of Arizonans. Although the standards set forth may be high, the legislature clearly desired to protect water resources and if they wanted to make a different standard for uranium mine facilities, they would have done so."

ADEQ Response

These comments present an overly narrow reading of A.R.S. § 49- 243(B) that errantly purports to require a total elimination of any risk of discharge. A full reading of the statute shows that technical, practical, and cost effectiveness considerations are balancing factors in determining the appropriate standards for a facility. A.R.S. § 49- 243(D) states: "In assessing technology, processes, operating methods and other alternatives for the purposes of this section, "practicable" means able to be reasonably done from the standpoint of technical practicality and, except for pollutants addressed in subsection I of this section, economically achievable on an industry-wide basis." Moreover, A.R.S. § 49-243(C) stated that the ability to meet the requirements can be achieved either by demonstration or by applying presumptive controls, which ADEQ has implemented in the Individual APP Permit. ADEQ's requirements in the Individual APP Permit for controls and monitoring fulfill the requirements of A.R.S. § 49- 243.

A commenter stated that "if the statutory standards are not met, the Director is not compelled to issue a permit to the Permittee. If ADEQ moves forward and issues a permit to the Permittee to commence mining operations at the Mine, it does so at its own discretion, and such an action would be arbitrary and capricious. ADEQ will have chosen to permit a single mine operator, who has a history of submitting misleading information, at the risk of putting thousands of people in peril; it would represent yet another dark chapter in the brutal history of indigenous people of Arizona, who have disproportionately borne the consequences of uranium mining."

ADEQ Response

ADEQ is required by law to issue an Individual APP Permit to an applicant if all requirements in statute and rule are met. ADEQ has determined that all statutory and regulatory requirements have been met to issue an Individual APP Permit for the Mine.

A commenter suggested that ADEQ cannot make the legal finding that the Permittee's application meets A.R.S. § 49-243(B)(3) because ADEQ currently does not know whether the R-aquifer and C-aquifer at the POC already violate AWQS, as much of this information is listed as "TBD" in the Permit. The commenter noted that water from the R-aquifer that emits from springs in Supai Village exceeds the Environmental Protection Agency's (the "EPA") standard for arsenic in drinking water of 10 parts per billion, and does not want to see levels of arsenic continue to rise in the aquifers that emit (sic) to seeps and springs near Supai Village.

ADEQ Response

Since no discharges from the Mine to any aquifer have occurred, establishing standards based on monitoring data collected before mining activity is technically and legally acceptable. As discussed in the subsection Baseline and Ambient Background Groundwater Conditions, the current monitoring constitutes ambient or background conditions for assessing and establishing ALs and AQLs. Whether or not existing aquifers currently meet AWQS, ADEQ's ability to set appropriate standards to protect groundwater quality is based on ambient monitoring.

The naturally occurring arsenic issues at Supai village are approximately 40 miles (straight line distance) from the Mine and subject to different local geochemical and other conditions. These observations are not germane to the Individual APP Permit. As ADEQ discussed in the subsection Role of Stratigraphic Tilt , the estimated potential groundwater flowpath to springs in the vicinity of Supai is approximately 50 miles. This represents centuries of travel time and any geochemical changes would not persist over this distance and time. Moreover, the Individual APP Permit requires controls to minimize or eliminate any discharge and action to be taken if data at the POC show migration is occurring, which is protective of the entire aquifer.

APP PERMIT MUST INCLUDE THE FOLLOWING CONDITIONS

Commenters asserted the Individual APP Permit must contain the following items to be issued:

ABATEMENT OF ALL GROUNDWATER FLOODING THE MINE

Multiple commenters stated the permit should require immediate abatement of all groundwater flooding the Mine.

ADEQ Response

ADEQ acknowledges that groundwater has been entering the Mine at around 19 gpm. However, the Individual APP Permit requires the Permittee to pump water from the lined Mine shaft sump to prevent groundwater seepage from accumulating. For additional information on this matter, refer to the Mine Flooding Section of this Responsiveness Summary.

IMMEDIATE CLOSURE, REMEDIATION, AND MITIGATION

Multiple commenters stated the permit should require the immediate closure, remediation, mitigation, monitoring, and post-closure maintenance activities.

ADEQ Response

ADEQ is required by law to issue an APP permit to an applicant if all requirements in statute and rule are met. The Individual APP Permit requires a closure plan and post-closure monitoring to ensure there is no existing or potential contamination at the Mine after mining is completed. If during post-closure monitoring it is discovered that there is a potential for contamination from the Mine, the Permittee must propose a plan for ADEQ's review to remove or neutralize the potential contamination source. For additional information on this matter, refer to the Closure Plan/Clean Closure Plan Section of this Responsiveness Summary.

SUFFICIENT MONITORING

Multiple commenters expressed "the permit should require sufficient monitoring wells based on outstanding information on the geophysics and down hole tv logging to establish the fracture tomography. Multiple and accurately placed monitoring wells will be critical given the heterogeneous and anisotropic nature of the geology at and surrounding the Mine. Require them to be monitored in perpetuity."

ADEQ Response

The Individual APP Permit requires monitoring of three wells installed in the C-aquifer as POC wells until ambient groundwater flow conditions resume, then the Permittee may select one of the three wells to remain as the POC well. There is one monitoring well located in the R-aquifer that has been accepted as the POC well for the R-aquifer. ADEQ has determined that this monitoring plan is effective to detect any potential groundwater contamination exceeding the permitted standards at POCs and that downhole TV logging and geophysics are not necessary. For additional information on this matter, refer to the Groundwater Movement and Groundwater Monitoring sections of this Responsiveness Summary.

DETAILED CLOSURE PLAN AND POST-CLOSURE MONITORING PLAN

Multiple commenters stated "the permit should require a detailed mitigation, remediation, and management plan in the event that groundwater contamination is detected in monitoring well(s) before, during, and/or after closure of the Mine. USGS and EPA should be engaged to devise these plans, especially given the significant environmental and human health risks and values that are at stake." Additionally, commenters stated "the permit should require a detailed closure and post-closure monitoring plan now that does not repurpose the outdated clean closure plan the Mine was required to develop for the USFS in the 1980s. These plans should also be devised by the USGS and the EPA."

Another commenter expressed the need for updated and well-developed closure and post-closure plans. "These are greatly needed because of the changed hydrological condition of the Mine and the potential impacts that future groundwater withdrawals on the R-Aquifer in the Tusayan area. With the increased water volume accumulating in the Mine, and the interactive nature between the R-aquifer and the C-aquifer, the original closure strategy is no longer valid. An updated closure and post-closure plan must be informed by actual and more recently available data to ensure that it will be safe and not pose a public health and safety threat to the many communities in northern Arizona that rely upon these aquifers to supply their drinking water. We ask that terms and conditions be included in any closure or post-closure plan to prevent discharge into and pollution of the R-aquifer from Mine workings; depletion of perched or other aquifers; and discharge from perched or other aquifers into Mine workings. We also ask that material exceeding regulatory radiation limitations not be left at the Mine or backfilled into the Mine shaft upon closure as these contaminants will pose a long-term threat to groundwater."

ADEQ Response

ADEQ reviewed and approved the closure plan submitted by the Permitted in its 2020 Individual APP Permit application. ADEQ did not rely on the 1980s closure plan. The approved plan is not the final closure plan and the final closure plan will be re-evaluated when the Permittee has the intent to cease operations. As discussed in the Groundwater Movement section of this document, ADEQ has determined that there is not an interactive nature between the C- and R-aquifers at the Mine. Although ADEQ is not required to engage EPA or USGS in review of closure plans, ADEQ has reviewed data from USGS in evaluating the Permittee's Individual APP permit application and drafting this Individual APP Permit. For additional information on this matter, refer to the Closure Plan/Clean Closure Plan Section of this Responsiveness Summary.

FINANCIAL ASSURANCE AND BOND

Commenters stated "the permit should require that the Mine's surety bond (insurance policy for cleanup) be held by the ADEQ, not the company, and this bond must preemptively account for the possibility of managing subsurface water contamination, not just when or if groundwater contamination is identified, which

could be long after the Mine owner has performed surface reclamation activities and handed off responsibility."

Additionally, a commenter stated "the permit needs a meaningful demonstration that EFRI has the financial capabilities to close and ensure proper post-closure care of the facility, pursuant to the requests listed here, and in an amount far greater than the $1,539,816.00 currently proposed. This demonstration should be through a performance surety bond held by DEQ, not EFRI. Such a bond must account for the possibility of managing groundwater contamination."

ADEQ Response

A.R.S. § 49-243(N)(3) requires an applicant to "...demonstrate financial responsibility to cover the estimated costs to close the facility and, if necessary, to conduct post closure monitoring and maintenance…" ADEQ does not have the authority to require additional closure amounts beyond what is required in rule and statute. The combined financial assurance amount for the Mine is provided in the form of a surety bond and is held by USFS and ADEQ. ADEQ and the USFS have access to the funds when ADEQ needs to implement the closure/post-closure plan in the event the Permittee defaults on its obligations or abandons the Mine. The closure and post-closure cost estimates change with time as conditions at the Mine change. APP rules require frequent updates to the closure/post-closure estimate, and continuous checks on the viability of the FAM. For additional information on this matter, refer to the Financial Assurance/ Bond Section of this Responsiveness Summary.

NEW HYDROGEOLOGIC STUDY

A commenter stated "the applicant should provide a comprehensive assessment of the area and its water systems, detailing all direct and indirect impacts that will be expected due to the Mine's operations. Given that the defense for the permit is based upon a faulty and weak analysis, this permit application should be rejected, and ADEQ must call upon EFRI to provide more complex and detailed assessments that will provide a complete and honest review of the Mine's effects on the landscape, and the region's precious water resources and surrounding communities."

Another commenter stated "there should be a development of a new hydrogeologic study to more accurately define the discharge impact area for closure and post-closure periods." The commenter added that, "given that mists from enhanced evaporation system at the lined Non-Stormwater Impoundment are carrying beyond the exterior fencing of the Mine, there is also need for documentation of the extent and degree of any known soil contamination at and near the Mine, and an assessment of the potential for the discharge to cause leaching of pollutants such as arsenic and uranium from surface soils or vadose materials. Most importantly to the Tribe, there is also a need for an assessment of any changes in the groundwater quality expected because of discharges from the Mine, as well as a description of any expected changes in the elevation or flow direction of the groundwater expected to be caused by the facility. All of this information should have been contained within a new hydrogeologic study that EFRI should have produced as part of their Individual APP Permit application."

ADEQ Response

ADEQ has determined that the current hydrogeologic study is sufficient. For additional information on the matter, refer to the Geology, Hydrogeology and the Closure Plan/Clean Closure Plan sections of this Responsiveness Summary.

AMBIENT GROUNDWATER DATA

Commenters stated "the permit should not be issued without ample data gathered through generation of multiple rounds of ambient groundwater samples to ensure that AWQS exceedances will be monitored and minimized through an Aquifer Quality Limit proposal for each pollutant that exceeds an AWQS." Additionally, the commenter stated "additional monitoring wells should be included based on outstanding information on the geophysics and down hole tv logging to establish fracture tomography."

Another commenter stated, “based on site characteristics showing elevated contamination in soil for uranium, arsenic, and other metals, within and surrounding the perimeter of the Mine, ADEQ must require EFRI to provide additional information as outlined in A.A.C. § R18-9-A-202(8)(b). For example, the application and draft permit contain no information about the existing quality of the water in the aquifers underlying the Mine. It is not enough for ADEQ to have this information collected at some later point in time. This information needs to be obtained prior to permit approval and be incorporated into the permit process in order for the public to have meaningful public comment and for ADEQ to be able to make a reasoned decision. This information is essential to understand the risks and impacts and to inform monitoring and remediation actions, yet ADEQ has permitted it to remain outstanding until well after the permit would be issued.”

ADEQ Response

For additional information on this matter, refer to the Groundwater Quality and Baseline and Ambient Background Groundwater Conditions sections of this Responsiveness Summary.

CONTINGENCY PLAN

Commenters stated “there needs to be development of a contingency plan to address future extraordinary high flow incidents in the Mine shaft if the discharge therefrom results in a violation of an AWQS or Discharge Limitation or an imminent and substantial endangerment to public health or environment. The occurrence of any of these conditions should trigger a requirement in the contingency plan to undertake verification sampling, provide notice to downstream or downgradient users, require more frequent and rigorous monitoring, trigger an ADEQ inspection, require testing, assess the need for maintenance, provide for an evaluation of effectiveness, and trigger an upgrade of the discharge control features at the Mine if necessary to address the grave threat increased discharges pose to drinking water in the region. Contingency procedures should also be developed to remediate water quantity and quality declines in groundwater, including the R-Aquifer and connected wells, springs, and streams.”

ADEQ Response

For additional information on this matter, refer to the Contingency Plan section of this Responsiveness Summary.

POST-CLOSURE MONITORING

A commenter stated, “cessation of operations at the Mine will require long-term monitoring to ensure no contamination of underlying aquifers, such as the R-aquifer. In addition to the above elements that should be incorporated into the closure permit, we request that DEQ, with technical assistance from USGS, implement the following monitoring and sampling requirements to address the specific dangers to our people that arose after mining operations pierced an underground aquifer: (i) multi- point downgradient water quality monitoring in the R-Aquifer; (ii) development of a long-term post-closure sampling program for at least 15 years; (iii) sampling in on-site water monitoring wells and springs at Havasu Springs, Indian Garden Springs, and Blue Springs; and (iv) that dye tracers be used to determine flow rates, pathways, and connectivity between perched and deep aquifers and connected seeps, springs, and streams. These costs should be borne by EFRI pursuant to Section VII(12) in the Record of Decision (the "ROD") where it is required that "[r]adiological surveys and appropriate cleanup measures" be taken "for all unplanned events, including . . . failure of the surface water control structures," such as the failure of the impoundments to contain the full amount of discharge from the Mine due to the perched aquifer piercing, and EFRI's desperate efforts to contain associated excess discharges. Pursuant to the ROD, "[a]II [such] monitoring will be by independent contractors and all costs shall be borne by the applicant."

ADEQ Response

ADEQ has determined that the monitoring required in the Individual APP Permit, as revised, is sufficient. The closure and post-closure plan have been modified to require post-closure monitoring be continued for 30 years after mining operations on the Mine have ceased. The Permittee is required to monitor water quality for all the parameters in Table 9 of the Individual APP Permit to assess geochemical conditions at the POC wells. If during the post-closure period it is discovered that there is a potential for contamination from the Mine, the Permittee is required to propose a plan for ADEQ's review to remove or neutralize the potential contamination source. For additional information on this matter, refer to the Groundwater Movement Section and the Tracer Tests subsection of this Responsiveness Summary.

SOIL AND BIOLOGICAL MONITORING

A commenter stated "ADEQ groundwater quality standards are based upon drinking water standards, they are not sufficiently protective of aquatic life and ecological health, which are much more sensitive to pollutants. Therefore, in addition to the proposed groundwater quality monitoring, the permit should also require biological monitoring of the adjacent forest land, as well as nearby springs and seeps. Human health and domestic animal toxicity monitoring may also be warranted, given the potential impacts to the Havasupai reservation."

A commenter stated "the "enhanced evaporation system" has succeeded in dispersing contaminants into the air where it is carried by the wind to adjacent forest land. Due to the potential to contaminate adjacent soils and waters, as well as to injure plants and animals living there, the permit must require soil and biological sampling of the adjacent areas. In addition, the permit must require protection for any birds or wildlife coming to drink out of these surface ponds. If these regulatory measures - necessary for the protection of the adjacent public lands and environment are beyond the scope of the aquifer protection permit -- then the permit is inadequate to protect the environment and must be denied."

ADEQ Response

The APP, as designed by state law, solely regulates discharges of pollutants to groundwater to protect water quality, and does not have the legal authority to require the Permittee to do biological monitoring. For additional information on this matter, refer to the Operational Concerns Section of this Responsiveness Summary.

DISCHARGE MONITORING

A commenter suggested that ADEQ should require monitoring for Total Suspended Sediments [sic]. The commenter asserts that mining operations universally generate sediment, and this should be addressed, and that high sediment loads would likely indicate exceedance of other pollutant levels. In addition, the commenter asserts that mining operations universally generate oil and grease pollutants, and these should be included.

The commenter asked ADEQ to clarify the schedule for monitoring. The commenter states that "wording in the draft permit implies that most monitoring would be conducted on a quarterly basis, but the permit language itself is ambiguous. Conductance can be easily monitored on a daily basis, and exceedances and/or irregularities should lead to sampling additional parameters."

ADEQ Response

The Individual APP Permit requires direct monitoring of pollutants in water collected from the lined Mine shaft sump be characterized against the parameters listed in Table 7 Routine Discharging Monitoring of the Individual APP Permit. Since analysis of the Table 9 parameters for groundwater quality are required to determine permit compliance at the POC, measurement of TSS is not required.

PUBLIC PROCESS

A commenter stated "there should be a public process to ensure that public awareness and engagement be maximized with respect to the Mine's Individual APP Permit due to the level of threat that the contamination of the perched aquifer at the Mine poses to surrounding aquifers and the public who rely upon those aquifers."

ADEQ Response

ADEQ is required to hold a public comment period for a minimum of 30 days. The public comment period for the Individual APP Permit for the Mine was extended to 45 days beginning June 23, 2021 and ending August 7, 2021.

The Public Notice was made available in the Arizona Daily Sun newspaper and on the ADEQ website at the following link: https://azdeq.gov/public-notice-public-hearing-preliminary-decision-issue-new-aquifer-protection-permit-pinyon-plain.

A virtual public hearing was held on August 9,2021 and ADEQ allowed any participants that did not state their entire verbal comments to email their comments in full to PinyonPlainAPP@azdeq.gov by midnight of August 9, 2021.

DEFICIENCIES IN THE DRAFT PERMIT

Commenters asserted the following items are deficiencies in the draft permit:

PERMIT SECTION 2.1 FACILITY DESCRIPTION

A commenter stated that the "draft permit describes the location of the uranium mine as encompassing "approximately 17 acres located 150 miles north of Phoenix, 45 miles north of the Town of Williams, and 6 miles south of the community of Tusayan." The proximity of the Mine to Phoenix is completely irrelevant. However, identifying the Mine's proximity to the South Rim of the Grand Canyon National Park and the Havasupai Tribal Reservation is critical. Just because the permit applicant decided to change the name of the project to "Pinyon Plain Mine" instead of "Canyon Mine" does not make the Grand Canyon and its historical and contemporary inhabitants disappear. The Mine is located within the Kaibab National Forest. It impacts these public and tribal lands and residents, who are much closer than Phoenix or even Williams. Please correct this egregious error."

Additionally, a commenter stated "a mine operations area of 17 acres is not indicative of the extent of influence from this Mine. The effects of localized groundwater drawdown, propagation of those effects over time, and the potential for off-site migration of contamination significantly increases the area impacted by mine operations."

ADEQ Response

The purpose of the facility description in the Individual APP Permit is to provide an exact location of the Mine. Any additional information provided is not required by Rule. Supplemental information is meant to provide regional context for the Mine location in proximity to towns or cities. The noted acreage of the Mine in the facility description is a factual statement of the fenced off area of the Mine.

HARVESTED GROUNDWATER

A commenter stated that the "proposed permit states that "Groundwater seeping from the Kaibab and Coconino formations harvested from the shaft collection rings will be used for dust control and other beneficial uses such as stock watering for local ranchers." The harvested groundwater has the potential to contain multiple contaminants, including sediments, oil and grease, heavy metals, and uranium. This groundwater should be tested before use, and particularly if it is going to be used to provide water to domestic animals."

A commenter states “please amend the permit to require monitoring for this harvested groundwater and soil sampling for the areas in which it is used. Any animals drinking this water should also be periodically tested to ensure that they are not accumulating toxins and radiation in their bodies. If the water quality for these proposed uses cannot be regulated under the aquifer protection program, then the permit should deny the applicant the ability to use the harvested groundwater for these so-called “beneficial uses,” which are hardly beneficial if they are going to further disperse contaminants and poison livestock."

Another commenter states that the “permit application registration fee flow rate is for 57,000 gallons per day. The application states that the groundwater removed from the Coconino and Redwall-Muav aquifers will be used for dust suppression and stock watering. As it is unlikely that such a volume is going to be utilized for these purposes daily, there is no explanation of where the excess water is going to be directed or stored. If the "water rings" continue to capture water from the Coconino aquifer before it approaches the ore body, we would like to see some of this water used to recharge the Coconino aquifer (regular testing would still be needed to make sure this water remains unimpacted). This could mitigate some potential impacts from the current dewatering occurring around the Mine shaft. If the clean water from the Coconino Aquifer is stored in the lined Non-Stormwater Impoundment (the only water storage facility known at the Mine) and evaporated using fans, there will be additional health/environmental impacts from particulate matter generation. Water is expected to remain unimpacted, but if impacted will be treated. Treatment of contaminated groundwater would result in additional dewatering of the aquifer beyond that of normal mine operation at some unknown rate.”

ADEQ Response

Water collected from the Mine sump and water rings will be pumped to the surface and stored in the lined Non-Stormwater Impoundment or water tanks if collected by the water rings. Regardless of the source of water being collected, the Individual APP Permit requires that any water being used for on-site dust control be treated to meet AWQS prior to use. The Individual APP Permit, as designed by state law, solely regulates discharges of pollutants to groundwater to protect water quality, and does not have the legal authority to address use of this treated water if transported off-site. For additional information on this matter, refer to the Operational Concerns Section of this Responsiveness Summary.

PERMIT SECTION 2.1.2 FINANCIAL CAPABILITY

A commenter stated that “the bond of $1.4M for facility closure may be sufficient for physical closure, but is inadequate to properly close the Mine if there are groundwater impairments. There also does not appear to be any money set aside to monitor the planned groundwater seal to prevent Coconino aquifer water from dripping through the Mine shaft. This is a significant concern as a leak could have a large impact on the Coconino aquifer and could also mobilize heavy metals from around the extracted ore body. We would like to see money set aside for mitigation in the case of groundwater contamination as well as a plan for long-term monitoring of the shaft to make sure it does not become a groundwater conduit after the mine is closed.”

ADEQ Response

For additional information on this matter, refer to the Financial Assurance Bond Section of this Responsiveness Summary.

PERMIT SECTION 2.2.2 SITE-SPECIFIC CHARACTERISTICS

A commenter expressed the following concerns:

- “The extensive karst development and cave systems found within both the Redwall and Muav limestones in the Grand Canyon region imparts a complex secondary porosity to these units and should not be considered "simple layer cake" geology. Research from recent dye tracing studies in the Redwall-Muav and Coconino aquifers on the Kaibab Plateau show that flow paths in these geologic units can be incredibly complex and non-intuitive (Tobin and others, 2021). In one case, dye flow paths traveled in opposite directions along a single fault without mixing. These results suggest that

the karst in the same geologic formations on the Coconino Platform may also result in a complex hydrological system not captured in simple 'layer cake' models."

- "The gentle regional dip of stratigraphy in the area does not necessarily dictate groundwater flow direction at the site scale. Low dip angles and groundwater mounding (which creates the groundwater divide in this area) can result in gradients against regional dip, and secondary porosity in fractures and solution features may result in flow directions other than dip direction. Finally, localized cones of depression can alter gradients and shift the location of groundwater divides."
- "In the permit application, it is stated that there is a "demonstrated absence of large geologic structures" but the evidence for this comes from only several small diameter core holes and wells. This accounts for a miniscule sample of the entirety of the area potentially influenced by mine activities. The applicant has improperly extrapolated surface observations to the full section nearly 3,000 feet below, and therefore can infer or assume the absence of geologic structures but has by no means "demonstrated" an absence of them."
- "Additionally, while carbon-14 age dating indicates that some component of regional groundwater can be on the order of thousands of years old, this statement ignores that groundwaters have also been found to contain contributions of more recent recharge (Solder and others, 2020)."
- "Past uranium exploration activities have shown links between spring chemistry and nearby pipe mineralization (Wenrich and others, 1994) indicating groundwater interaction with ore bodies over much more recent timescales."
- "Iron is abundant within the Supai Group and Hermit Formation, but not throughout the entire zone of uranium mineralization. Additionally, the ability to sorb dissolved metals will depend on redox conditions and should not be considered a given to occur nor a means of sequestering all dissolved metals potentially leaving the Mine."
- "This statement is confusing; the applicant claims that the carbonate units that make up the Redwall-Muav aquifer are themselves a confining unit. These units (Redwall, Temple Butte, and Muav) make up the aquifer, which is a source of water to wells in Tusayan, Valle, Williams, and the applicant's own supply well, as well as the discharge units of the region's largest springs, indicating these units have the capacity of transmitting large amounts of groundwater through preferential pathways. Because small diameter wells and core holes did not intersect any of these features at the Mine does not preclude their existence."

ADEQ Response

For additional information on this matter, refer to the Geology and Hydrogeology Section of this Responsiveness Summary.

PERMIT SECTION 2.3 DISCHARGING LIMITATIONS

A commenter stated, "considering a liner failure is defined by any leakage that exceeds 550 gallons per day per acre, this implies that a release of potentially contaminated water at a rate of 549 gallons per day is an acceptable loss from the impoundment structures at the Mine. Please clarify the presumptions used to determine that this volume would be considered an acceptable release."

ADEQ Response

ADEQ acknowledges the comments and recognizes that the reference to a 550 gallons per day per acre leakage rate was incorrectly applied and not relevant to this Individual APP Permit. The final Individual APP Permit was modified to remove this reference.

The commenter also stated, "it appears that the Development Rock Stockpile will not require any lining or monitoring. It is unlikely that this material will be completely devoid of any mineralization (just not

economically viable). We would like to see mitigations to either prevent this material from interacting with oxidized meteoric water and becoming mobile or capturing impacted runoff from the area similar to the Intermediate Ore Stockpile."

ADEQ Response

The Development Rock Stockpile is set on a 12-inch pad of screened native fill material and has drainage to Lined Non-Stormwater Impoundment through an HDPE culvert. It is also protected by a 3-foot high perimeter berm and graded to minimize ponding.

PERMIT SECTION 2.5.3 GROUNDWATER MONITORING AND SAMPLING PROTOCOLS

A commenter stated that the "water levels in both Coconino and Redwall-Muav aquifer wells should be monitored continually, rather than just when sampling occurs. This will provide important information on the effects of mine dewatering and how both shallow and deep groundwater respond to event and seasonal-scale recharge."

Additionally, the commenter added, "while downgradient monitoring points are located within the Coconino aquifer, the only Redwall-Muav well in the area is on the north end of the Mine (upgradient according to simple models). The heterogeneous nature of dissolution cavities in the Redwall-Muav makes it difficult to be sure any single well is functionally downgradient of the Mine so multiple wells are needed to adequately monitor for contaminants. In a rationale for approving the existing Redwall-Muav aquifer well location as a POC, ADEQ states in its Draft Executive Summary document (Section VII) that because operation of the well would induce a localized cone of depression that water will be drawn to the upgradient location. It additionally states that groundwater will move horizontally towards an upgradient monitoring location as it "migrates vertically through over 500 feet of impermeable rock". Not only is it a contradiction to state that water is migrating through impermeable rock, especially at a time scale to allow for representative monitoring at an upgradient site, it is also in conflict with previous claims that rocks of the Supai and Redwall are so impermeable that no vertical movement of groundwater is possible. A reexamination of these statements and the rationale used would help us better understand potential impacts to the groundwater system."

ADEQ Response

For additional information on this matter, refer to the Groundwater Monitoring Section, specifically the R=aquifer Monitoring Well Sub-section, of this Responsiveness Summary.

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PERMIT SECTION 2.5.3.3 ALERT LEVELS FOR POINTS OF COMPLIANCE WELLS

A commenter stated that "considering the C-aquifer point of compliance wells have not been determined, a strong justification needs to be made if a well other than the downgradient one is selected."

ADEQ Response

The Individual APP Permit has been updated to include all three monitoring wells in the C-aquifer as POC wells. For additional information on this matter, refer to the Groundwater Monitoring Section of this Responsiveness Summary.

PERMIT SECTION 2.5.3.5 AQL FOR URANIUM FOR POC WELLS

A commenter stated "if ambient conditions of groundwater are found in the POCs to contain less than 30 µg/L uranium, setting an Aquifer Quality Limit at the EPA maximum contaminant level (30 µg/L uranium) equates to allowable degradation of groundwater quality. For example, five samples collected from the adjacent USGS monitoring well between 2017 and 2021 show uranium concentrations ranging from 0.86 to 5.0 µg/L in the ambient groundwater."

Another commenter stated that "it should not be up to EFRI to determine a "numeric AQL for Uranium in the POC Wells" if ambient sampling results are higher than the EPA's MCL."

ADEQ Response

After completion of the ambient groundwater monitoring for the C- and R-aquifer wells, the Permittee will submit a permit amendment to set a numeric AQL for uranium in the POC wells. ADEQ's process for setting an AQL in a permit once ambient concentrations are determined is based on A.A.C. R18-9-A205, which requires the AQL to be set at the AWQS if the ambient results are less than the AWQS. If the ambient results are higher than the AWQS, ADEQ will set a higher AQL based on Statistical Analysis of the ambient groundwater monitoring data. Although the uranium MCL has not been established as an AWQS, ADEQ will follow the same process in setting the AQL for uranium and use the MCL as the AWQS.

PERMIT SECTION 2.5.3.7 COCONINO GROUNDWATER MONITORING WELLS

A commenter stated that "the three monitoring wells drilled into the Coconino are all located within a few hundred feet of each other at the Mine. This distribution is good for detecting potential contamination, but the wells are likely too close together to assess groundwater flow direction or the extent of the cone of depression. We would like to see a wider network of wells around the Mine to determine groundwater flow direction in the Coconino and Redwall-Muav aquifers. This wider network would also be able to assess the cone of depression around the Mine in the Coconino aquifer to see if its impact may be propagating towards springs in GCNP."

ADEQ Response

For additional information on this matter, refer to the Groundwater Monitoring Section of this Responsiveness Summary.

PERMIT SECTION 2.6.4 AQUIFER QUALITY LIMIT EXCEEDANCES

A commenter noted that "almost everything in proposed Draft Permit No. P-100333 says the Permittee "shall" do this (or that), or it says that the Department "shall" do this (or that). But when it comes to what should be at least as major a concern as any other – which is "2.6.4 Aquifer Quality Limit Exceedances", all of a sudden "shall" changes to "may"."

The commenter added, "Let's examine "1." Under 2.6.4. Aquifer Quality Limit Exceedances. Under "1.", if a pollutant is above the "Aquifer Quality Limit", then "the Permittee may conduct verification sampling for those pollutant(s) that were above their respective AQL(s) within five (5) days of becoming aware of the exceedance." So, the Permittee may sample such or not! The last sentence under "1." says that "The Permittee may use results of another sample taken between the date of the last sampling event and the date of receiving the result as verification." The paragraph is worded such that the Permittee will not have to do either option just mentioned. Plus, the second option is ripe for abuse to substitute either a bogus sample or a sample from another area which does not have the AQL exceedance that the one sample indicated. Thus, the first sentence should read "the Permittee SHALL conduct verification sampling for these pollutant(s) that were above their respective AQL(s) within five (5) days of becoming aware of the exceedance." There is likely purposefully vague wording in the longer third paragraph under "3." Unless the Permittee has demonstrated that the exceedance was not caused or contributed to by pollutants discharged from the Mine, the Permittee SHALL consider and ADEQ may require corrective action that may include control of the source of discharge, cleanup of affected soil, surface water, or groundwater, and mitigation of the impact of pollutants on existing uses of the aquifer."

The commenter also stated "demand corrective action by this disreputable party feeding all sort of hydrological lies to involved agencies – do not allow them to "weasel out" by using the vague term "may"! ADEQ should have action levels, and the Permittee must do more than "shall consider"! I also have concerns about the use of the "may" word under "4." of 2.6.4 Aquifer Quality Limit Exceedances the Draft Permit

reads: "Upon review of the submitted report, the Department may amend the permit to require additional monitoring, increased frequency of monitoring, amendments to permit conditions or other actions." I call for certain "Action Levels" under which the ADEQ would be required to help to remedy the Aquifer Quality Limit Exceedance-- rather than give them an option to do nothing to address the serious pollutant issue -- thus "shall" and not "may" is called for here."

ADEQ Response

Within A.A.C. R18-9-A204(B), verification sampling is an action that a Permittee may perform within a contingency plan if a discharge results in a violation of an AQL. As a result, ADEQ cannot require that verification sampling be performed. In the event that the Permittee does not perform verification sampling, the initial sample which resulted in an exceedance of an AQL would remain an exceedance and, as such, the Permittee would be required to implement corrective actions.

GROUNDWATER MONITORING TABLES

A commenter noted that "most pollutants, including all radioactive pollutants that I saw mentioned, will only be sampled on a "quarterly" basis. That is not being protective of groundwater resources even if we were not in a historic drought. We need monthly sampling in various parts of the aquifer, with even more sampling if there is an uptick in intensity of mining and shaft activities in a certain area."

ADEQ Response

The required groundwater monitoring sampling schedule in this permit is quarterly, which is sufficient for potential release detection and compliance monitoring, as changes in groundwater occur slowly over time.

If an exceedance of an AL or AQL is identified as a result of a sampling event, accelerated monitoring will be enacted, which in this instance will require an increase in sampling frequency to monthly. To return to the quarterly routine sampling frequency, the Permittee must demonstrate four consecutive monthly sample results less than the AL or AQL. ADEQ has the authority to amend the Individual APP Permit to require changes to the monitoring frequency, if warranted.

CRITERIA FOR ISSUING A PERMIT

A commenter stated the "pervasive deficiencies in the draft permit would make ADEQ's issuance of the permit contrary to the law, unsupported by substantial evidence, arbitrary and capricious, or otherwise an abuse of discretion. Because the criteria for issuing a permit are not met, ADEQ must, as it has done in the past, deny the individual aquifer permit as proposed."

Additionally, a commenter asserted the "draft permit lacks critical information for the public to provide meaningful comment and to ensure that the director can make a decision as to whether issuing the permit complies with the aquifer protection requirements. This includes, but is not limited to, the failure to: identify alert levels, establish the current baselines of the Coconino and Redwall-Muav aquifers, identify all points of compliance, include monitoring requirements that would capture extent and movement of contamination in the aquifers before, during, and post-mining, and institute closure and contingency plans that account for contamination and how such contamination would be mitigated."

ADEQ Response

ADEQ has determined that all statute and rule requirements have been met for the Mine and disagrees with the assertion that the Individual APP Permit contains deficiencies. ADEQ is required by law to issue an Individual APP Permit to an applicant if all requirements in statute and rule are met.

3.9. General Opposition

Several commenters expressed strong opposition to the operation of the Mine and to mining in general without specific comments on the Individual APP Permit.

ADEQ Response

ADEQ acknowledges the comments submitted in opposition.

3.10. General Support

Some commenters expressed support for the operation of the Mine.

ADEQ Response

ADEQ acknowledges the comments submitted in support.

3.11. USFS

3.11.1. EIS

Commenters stated the following concerns regarding the USFS Environmental Impact Statement (EIS):

Impacts To Water Supply Wells In Tusayan Are Not Addressed

Commenters assert that the Environmental Impact Statement (EIS) done for this Mine needs updating, and both The Arizona Department of Environmental Quality (ADEQ) and The Kaibab National Forest (KNFS) should consider the facts that need to be updated in that document. When the KNFS did the EIS for the Mine in 1986 Tusayan, which is six miles from the Mine, did not have water wells. It now has three deep water wells and more have been placed in other areas near the Mine.

The Mine Poses A Significant Risk Of Contaminating Groundwater Supply Wells In Tusayan

Commenters disagree with ROD findings and assert that the USFS and ADEQ have for decades incorrectly assumed that the Mine poses no significant risk to groundwater. Groundwater flooding at the Mine, which is ongoing, now repudiates that assumption. When the USFS issued a Final Environmental Impact Statement for the Canyon Mine in August of 1986, the agency concluded that: “The possibility of significant groundwater contamination is remote. Groundwater flows, if they exist, are likely to be at least 1,000 feet below the lower extremities of the mine,” and that, “the low potential for encountering groundwater in the mine effectively eliminates the possibility of contaminating the Redwall-Muav aquifer.” A Record of Decision on September 26th of that same year approved the Mine.

Commenters Disagree With USFS Findings In The 2012 Canyon Uranium Mine Review

As part of the 2012 action, USFS prepared a “Mine Review,” as well as an assessment of the operators’ “valid existing right” and a review under the Endangered Species Act. Commenters allege that USFS did not: 1) allow the public to comment during the review process; 2) adopt the conservation measures proposed by the U.S. Fish and Wildlife Service to protect the California condor; or 3) prepare a supplemental National Environmental Policy Act (NEPA) review. Commenters state USFS also did not prepare an updated historical and cultural review under the National Historic Preservation Act, despite the

designation of Red Butte as a Traditional Cultural Property and despite objections from the Advisory Council on Historic Preservation and the Arizona State Historic Preservation Officer.

ADEQ Response

The USFS EIS was performed under the federal requirements of the National Environmental Policy Act (NEPA) and the decision to issue the EIS was upheld in appeals and court cases. ADEQ has no authority over the EIS or the Mine Plan of Operations (POO) approved by the USFS. Questions about the validity of the EIS, Record of Decision (ROD), and POO can be directed to USFS.

3.12. FORM LETTERS

Commenters stated the following concerns through the submission of form letters:

- **Issue a permit for closure and cleanup**: Commenters urged ADEQ to deny the "individual aquifer protection permit" for the Mine and instead issue a permit only for the immediate closure and cleanup of the Mine.
- **Risks to water quantity**: Commenters asserted the "Mine has threatened the Grand Canyon region's precious water and wildlife, and the Havasupai Tribe's primary source of drinking water. Renewing the Mine's permit further risks groundwater already stressed by long-term drought and changing climate, and threatens water quantity for Grand Canyon's life-giving south rim springs and seeps, including remarkably diverse and unique springs ecosystems."
- **Risks to water quality**: Commenters asserted the aquifer protection permit "being proposed for the Mine does not ensure that the aquifers in the region and the Grand Canyon's seeps and springs will be protected from uranium contamination. The reason Arizona has an aquifer protection permit program is because we recognize how precious water is and that it is imperative that we protect our groundwater from contamination."
- **Risks to wildlife**: Commenters stated the Mine is threatening aquifers and springs and the on-site pond is attracting wildlife who are consuming the toxic water. The stakes are too high in this region where humans and wildlife depend on limited water supplies and fragile springs.

Commenters suggested the permit should require the following:

- **Increased monitoring**: Commenters demand the installation of at least three monitoring wells up and down gradient in both the shallower Coconino (C) aquifer and the deeper Redwall-Muav (R) aquifer to monitor groundwater contamination.
- **Groundwater monitoring after closure**: Commenters suggested groundwater monitoring in perpetuity, even after the Mine is closed. Plugging groundwater flow into the Mine to prevent the spread of contaminants should not be assumed to be effective.
- **Detailed contingency plan**: Commenters requested a detailed plan for stopping and cleaning up any groundwater contamination if contamination is detected in monitoring well(s) before, during, and/or after the Mine is closed.
- **An updated closure and post-closure plan**: Commenters requested immediate preparation of a detailed closure and post-closure monitoring plan to replace the outdated plan the Mine owner developed in the 1980s.
- **Require groundwater remediation costs in bond**: Commenters insist on a surety bond (insurance policy for cleanup) that accounts for the possibility of subsurface water contamination. Commenters

assert that managing subsurface contamination can be the most expensive part of Mine cleanup and should not fall on taxpayers.

ADEQ Response

Issue a Permit for Closure and Cleanup

ADEQ is required by law to issue an Individual APP Permit to an applicant if all requirements in statute and rule are met. The Individual APP Permit requires a closure plan and post-closure monitoring to ensure there is no existing or potential contamination at the Mine after mining is completed. If during post-closure monitoring it is discovered that there is a potential for contamination from the Mine, the Permittee must propose a plan for ADEQ's review to remove or neutralize the potential contamination source. For additional information on this matter, refer to the Closure Plan/Clean Closure Plan Section of this Responsiveness Summary.

Risks to Water Quantity

Quantity of Arizona's groundwater supplies is beyond the scope of ADEQ's authorizing statutes for the APP, which is focused on preserving groundwater quality. Please refer to the Groundwater Quantity, Non-water Quality Environmental Impacts, and Drought and Climate Change Sections of this Responsiveness Summary Document for details.

Risks to Water Quality

The Individual APP Permit is designed to ensure that no groundwater contamination exceeds the permitted standards at the POCs. If ADEQ finds evidence that groundwater contamination is (or could be) occurring, the agency has the legal authority to order the installation of additional monitoring wells and corrective actions. For additional information on this matter, refer to the Groundwater Quality, Groundwater Quantity and Groundwater Movements sections of this Responsiveness Summary.

Risks to Wildlife

The APP, as designed by state law, regulates discharges of pollutants to groundwater to protect groundwater quality, and does not have the authority to require the Permittee to include measures to prevent access by wildlife. Nonetheless, the Mine is completely surrounded by fencing to minimize the potential for wildlife and the public to enter the Mine. For additional information on this matter, refer to the Wildlife Section of this Responsiveness Summary.

Increased Monitoring

The Individual APP Permit has been updated to require monitoring of the three wells installed in the C-aquifer as POC wells. Once the Mine's dewatering operations have ceased and ambient groundwater flow resumes, the Permittee may select one of the three C-aquifer wells as the downgradient POC well. There is one monitoring well located in the R-aquifer that has been accepted as the POC well for the R-aquifer. ADEQ believes this monitoring plan is effective to detect any potential groundwater contamination at the POCS. For additional information on this matter, refer to the Groundwater Monitoring Section of this Responsiveness Summary.

Groundwater Monitoring After Closure

The closure and post-closure plan were modified to require monitoring for 30 years after mining operations at the Mine have ceased. The Permittee is required to monitor water quality at the POC wells and monitor for stability and water quality in the underground Mine workings. If during the post-closure period it is discovered that there is a potential for contamination from the Mine, the Permittee is required to propose a plan for ADEQ's review to remove or neutralize the potential contamination source. The closure/post-closure cost for 30-years has been revised to reflect the new activities.

An APP-regulated facility cannot terminate (release) its permit until all potential sources of pollutants have been removed, mitigated, or chemically stabilized. If during the post-closure monitoring period it is discovered that chemical stabilization has not been achieved, ADEQ may require additional permanent closure actions, after which a new post-closure monitoring period will commence. As noted above the Individual APP Permit will require a 30-year post closure monitoring period. For further information on this matter, refer to the Closure Plan / Clean Closure Plan Section of this Responsiveness Summary.

Detailed Contingency Plan

The Contingency Plan, referenced in A.A.C. R18-9-A204, is a document that is prepared by the applicant, reviewed and approved by ADEQ as part of the review of the project Individual APP application and related documents. The Contingency Plan submitted by the Permittee is located within the Individual APP Permit application, Section 6, which can be viewed on the website at https://azdeq.gov/PinyonPlainMineAZPermitting.

The Contingency Plan must be kept on-site at all times and must be available for inspection by ADEQ inspectors upon request. The Permittee is responsible for compliance with contingency plans relating to the exceedance of an AL or violation of a DL, AQL or any other permit condition. The Permittee is subject to enforcement action for the failure to comply with any contingency actions in this Individual APP Permit. If any changes occur to the Contingency Plan, the Permittee must submit a permit amendment to update the plan. For additional information on this matter, refer to the Contingency Plan Section of this Responsiveness Summary.

Updated Closure and Post-Closure Plan

ADEQ reviewed and approved the closure plan submitted by the Permittee in its 2020 Individual APP Permit application. ADEQ did not rely on the 1980s closure plan. The approved plan is not the final closure plan and the final closure plan will be re-evaluated when the Permittee has the intent to cease operations. For additional information on this matter, refer to the Closure Plan/Clean Closure Plan Section of this Responsiveness Summary.

Require Groundwater Remediation Costs in Bond

ADEQ's authority (A.R.S. § 49-243(N)(3)) requires an applicant to "...demonstrate financial responsibility to cover the estimated costs to close the facility and, if necessary, to conduct post closure monitoring and maintenance…" As such, ADEQ does not have the authority to require additional closure amounts beyond what is required in rule and statute. The combined financial assurance amount for the Mine is provided in the form of a surety bond and is held by USFS and ADEQ. ADEQ and USFS have access to the funds if ADEQ needs to implement the closure/post-closure plan in the event the Permittee defaults on its obligations or abandons the Mine. The closure and post-closure cost estimates change with time as conditions at the Mine change. APP rules require frequent updates to the closure/post-closure estimate, and continuous checks on the viability of the FAM. Based on ADEQ's review of the BADCT provided and the site conditions, ADEQ does not anticipate groundwater contamination and cannot include the possibility of groundwater contamination and the potential need for groundwater remediation in the closure/post-closure plan. For additional information on this matter, refer to the Financial Assurance/ Bond and the BADCT sections of this Responsiveness Summary.

4.0 APPENDIX: LIST OF ACRONYMS

A.A.C.	Arizona Administrative Code
ACC	Arizona Corporation Commission
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
AL	Alert Level
APP	Aquifer Protection Program
AQL	Aquifer Quality Limit
ARD	Acid Rock Drainage
A.R.S.	Arizona Revised Statutes
AWQS	Aquifer Water Quality Standards
AZ	Arizona
BADCT	Best Available Demonstrated Control Technology
bgs	below ground surface
bls	below land surface
C-aquifer	Coconino aquifer
CARAMP	Coconino Plateau Watershed Partnership Matrix Project
CFR	Code of Federal Regulations
CSI	Compliance Schedule Item
CSM	Conceptual Site Model
DIA	Discharge Impact Area
DL	Discharge Limit
EFRI	Energy Fuels Resources (USA), Inc.
EIS	Environmental Impact Statement
ELMA	Errol Montgomery and Associates
EPA	Environmental Protection Agency
EPM	Equivalent Porous Medium
FA	Financial Assurance
FAM	Financial Assurance Mechanism
ft	feet
GCNP	Grand Canyon National Park
gpd	gallons per day
gpm	gallons per minute
HFM	Hydrogeologic Framework Model
HGC	Hydro Geo Chem, Inc.
KNFA	Kaibab National Forest
MCL	Maximum Contaminant Level
mg/L	milligrams per liter

NARGFM	Northern Arizona Regional Groundwater Flow Model
NEPA	National Environmental Policy Act
NRC	Nuclear Regulatory Commission
ORP	Oxidation Reduction Potential
pCi/L	picocuries per liter
PE	Professional Engineer
PMA	Pollutant Management Area
POC	Point of Compliance
POO	Plan of Operations
PPM	Pinyon Plain Mine
R-aquifer	Redwall-Muav aquifer
RG	Registered Geologist
RGRLGFM	Red Gap Ranch – Leupp Water Resources Environmental Assessment Groundwater Flow Model
ROD	Record of Decision
TSS	Total Suspended Solids
TU	Tritium Unit
ug/L	micrograms per liter
USFS	United States Forest Service
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compound
WQD	Water Quality Division

5.0 APPENDIX: LIST OF COMMENTERS

Commenter names, sorted alphabetically by last name, are listed once, regardless of the amount or type of responses one individual submitted.

	Last Name	First Name		Last Name	First Name
1	A.G.	Alicia	42	Allaire	Peggy
2	Abarca	Cecilia	43	Allbert	Amanda
3	Abbott	Sara	44	Allen	Aaron
4	Abel	Caroline	45	Allen	Sam
5	Abela	Maya	46	Allen	Sara
6	Ablan	Jenny	47	Allen	Susan
7	Abma	Katie	48	Allen	Victoria
8	Abrams	Janice	49	Allen	Russell
9	Abromavage	Rob	50	Aller	Deana
10	Acebo	Mike	51	Aller	Jennifer
11	Ackerman	Marjorie	52	Allsopp	Lauren
12	Adames	Noelle	53	Alonso	Joce
13	Adams	Christine	54	Alonzo	Arron
14	Adams	David	55	Altomare	Lisa
15	Adams	Jerilynn	56	Altshuler	John
16	Adams	L	57	Alvarez	Raymond
17	Adams	Lynda	58	Aman	Asfa
18	Adams	Lynn	59	Amberson	Melissa
19	Adamson	Aika	60	Ambler	Susan
20	Aden	Sandi	61	Ames	Carol
21	Adkins	Patti	62	Anderson	Debra
22	Adler	Isabel	63	Anderson	Edna
23	Adlhoch	Tom	64	Anderson	Fred
24	Adolph	Alesha	65	Anderson	Kathy
25	Aemlicka	Zachary	66	Anderson	Laurel
26	Agins	Richard	67	Anderson	Marlee
27	Aguilar	Ashley	68	Anderson	Mary
28	Ahearn	William	69	Anderson	Rebecca
29	Aiello	Claire	70	Anderson	Richard
30	Aitchison	Stewart	71	Anderson	Wyatt
31	Akers	Richard	72	Andre	Vickie
32	Alanis	Daniel	73	Andrew	Erica
33	Albrecht	Ann	74	Andrews	Nancy
34	Albrecht	Yvonne	75	Androff	Robert
35	Albright	Eric	76	Andruss	David
36	Albu	Marion	77	Angell	JL
37	Alden	Michael	78	Angelly	Mathew
38	Alderson	George	79	Anguiano	Lupe
39	Alexander	Daja	80	Annerino	John
40	Alexander	Peggy	81	Anthes	David
41	Alioto	Janice	82	Antoniades	Emilia

	Last Name	First Name		Last Name	First Name
83	Appleby	Brenda	130	Ba	Sugar
84	Aprati	Tyler	131	Babbitt	Susan
85	Aragon	Alicia	132	Babcock	Reb
86	Arcabascio	Debora	133	Bacharach	Craig
87	Arcana	Judith	134	Bacon	Drue
88	Arch	Greg	135	Bacon	Scarlett
89	Archibald	Jessica	136	Bacorn	Christopher
90	Archuleta	Bryon	137	Baehr	Emily
91	Arden	Ann	138	Baer	Joshua
92	Ardzronni	Juliette	139	Bahr	Sandy
93	Arena	Robyn	140	Baier	Mary
94	Arends	Joni	141	Bailery	Rachel
95	Arias	Carlos	142	Bailey	Marie
96	Armao	Fena	143	Bailey	Nancy
97	Armbrust	Shara	144	Bailie	Janae
98	Armentrout	Harley	145	Bain	Thomas
99	Armstrong	Dawn	146	Baka	Abby
100	Arndorfer	Mary	147	Baker	Danette
101	Arnett	Michael	148	Baker	Judith
102	Arnold	Aimee	149	Baker	Micheal
103	Aronson	CJ	150	Baker	Nelson
104	Arrewdondo	Teresa	151	Baker	Scott
105	Arrington	Karen	152	Baker	Sharon
106	Arroyo	Dorian	153	Baldwin	Anne
107	Art	David	154	Bales	Clarice
108	Arth	Amy	155	Balfour	Jessica
109	Ash	Susan	156	Balfour	Joan
110	Ashby	Lynn	157	Ball	Rae
111	Ashmore	Sandra	158	Ballard	Brian
112	Ashu	Kevin	159	Ballentine	Wanda
113	Atell	Chris	160	Bambauer	Jennifer
114	Atherton	Nancy	161	Bannan	Brian
115	Athey	Roger	162	Bansbach	Lauren
116	Atkinson	Ellen	163	Barbour	Jackie
117	Attrep	Kara	164	Barden	Jesse
118	Atwood	April	165	Bardsley	Alta
119	Audas	Mark	166	Barela	Erin
120	Augustin	Rebecca	167	Barelski	Lauren
121	Austin	Jana	168	Bargmann	Brendan
122	Austring	Dee	169	Barker	Richard
123	Avilla	Loretta	170	Barker	Scott
124	Axelrod	Alan	171	Barker	Weldon
125	Axelrod	Gene	172	Barkley	Dan
126	Ayers	Bob	173	Barlon	Gabriella
127	Ayers	Juana	174	Barnes	Joel
128	B	Debbie	175	Barnes	Stan
129	B	Jay	176	Barnette	Renee

	Last Name	First Name		Last Name	First Name
177	Barnhart	Collene	224	Belew	Lynette
178	Baron	Hannah	225	Belka	Talyne
179	Baron	Michael	226	Bell	Bridget
180	Barone	Sharon	227	Bell	Melinda
181	Barr	Ford	228	Bell	Sabrina
182	Barrett	Pete	229	Bell	Stephanie
183	Barry	Stephanie	230	Bell	T
184	Barry	Thomas	231	Beloin	Theodore
185	Bartlett	Cormac	232	Belus	Andrew
186	Barton	Michael	233	Belus	Mathew
187	Bash	Randall	234	Ben	Jordan
188	Basista	Alexis	235	Ben	Kathy
189	Bassett	Susan	236	Benally	Berta
190	Bastron	Natasha	237	Benally	John
191	Bates	Donna	238	Benally	Klee
192	Bates	Lori	239	Bengtson-Wong	Mary
193	Batjer	Elle	240	Ben-Horin	Jeri
194	Batjer	Elli	241	Benjamin	Dale
195	Batway	Jewell	242	Benn	Annette
196	Bauer	Ernst	243	Bennekaa	Cynthia
197	Baugh	Chase	244	Bennett	Jeb
198	Bautista	Maria	245	Bennett	River
199	Bautista	Melvin	246	Benschoter	John
200	Bayless	Elvira	247	Benson	Ashley
201	Bazz	Hava	248	Benson	Kimberly
202	Beach Hipp	Jane	249	Benson	Shanna
203	Beam	Ryan	250	Bentley	Don
204	Bean	Susan	251	Benton	Mary
205	Beatty	Susanna	252	Berbergi	Fio
206	Beavers	John	253	Berg	Mackenzie
207	Bechmann	Elisabeth	254	Bergenthal	Vanessa
208	Bechtel	Troy	255	Bergman	Don
209	Becker	Elaine	256	Bergner	Laura
210	Becker	Julie	257	Berkheimer	Nicole
211	Beckman	Gerald	258	Berkowitz	Henry
212	Becraft	Randy	259	Berlin	Anne
213	Bedolla	Xena	260	Berliner	Diana
214	Beebe	Russ	261	Berliner	Diane
215	Beers	Paula	262	Berman	Rachel
216	Begay	Dan	263	Bermant	Alison
217	Begler	Lilly	264	Bernard	Catherine
218	Behrhorst	Amy	265	Berry	Janet
219	Behrhorst	David	266	Berry	Nina
220	Behunin	Ivy	267	Berry	Patricia
221	Beiler	Kristen	268	Bersson	Jessica
222	Bein	Ann	269	Bertolino	Terry
223	Beiser	Antoinette	270	Bertollino	Terry

	Last Name	First Name		Last Name	First Name
271	Berus	Mark	318	Bliss	Gail
272	Bessler	Andy	319	Bloch	John
273	Best	Sat	320	Bloom	David
274	Bester	Adam	321	Bloomfield	Hartley
275	Betts	Christopher	322	Blue	Jennifer
276	Betzen	Jacob	323	Blum	Robert
277	Bevier	Cindy	324	Blume	Edda
278	Beyries	Michael	325	Blume	Eleanor
279	Bhakta	Priyanka	326	Blume	Kerry
280	Bhuta	Sunil	327	Blunt	Christine
281	Bickel	Bettina	328	Bobe	Pablo
282	Bickford	Carol	329	Boden	Laura
283	Bierly	Marie	330	Boden	Stephanie
284	Bierman	Kenneth	331	Bodnar	Joshua
285	Biewen	James	332	Bodnar	Russell
286	Bilagody	Rita	333	Boehle	Kira
287	Bildhauer	Mathias	334	Boehme	Lawrence
288	Billheimer	Myles	335	Boesen	Shani
289	Billings	Brian	336	Bohnert	Daniel
290	Bilsky	Cathy	337	Bohr	Ron
291	Bilyeu	Alyx	338	Bojorquez	Phillipe
292	Binkley	Shelly	339	Boland	Bob
293	Binnie	Alan	340	Bolanos	Megan
294	Bird	Janet	341	Boles	Danielle
295	Birkemeier	Sara	342	Boley	Allison
296	Bishop	Rachel	343	Bollich	Catherine
297	Bisschop	Petter	344	Bollinger	Susan
298	Bisschop	Peter	345	Bollweg	Jane
299	Bjerre	Mads	346	Bond	Michael
300	Black	Lee	347	Bonnell	Paula
301	Blackman	Jeffrey	348	Bonner	Dana
302	Blackmer Raynolds	Courtney	349	Boomer	Cindy
303	Blackshear	Rabina	350	Boon	Jim
304	Blackwell	Sharon	351	Bopp	Lorraine
305	Blahnik	David	352	Borbon	Maria
306	Blaile	Hannah	353	Borella	Bob
307	Blair	Curt	354	Boren	Caroline
308	Blaizgis	Monica	355	Borglin	Sharon
309	Blake	Susan	356	Borgogni	Rima
310	Blakeney	Stuart	357	Borkan	William
311	Blanco	Nolan	358	Born	Elijah
312	Blanton	Alicia	359	Borsi	Goran
313	Blanton	Lisa	360	Boswell	Arthur
314	Blasco	Nastalie	361	Bosworth	Lily
315	Blaustein	John	362	Bottoms	Sandra
316	Blersch	Kaysie	363	Boucher	Shawn
317	Bliss	Brian	364	Boud	Patricia

	Last Name	First Name		Last Name	First Name
365	Boutwell	Richard	412	Broker	Thomas
366	Bower	C.	413	Bromley	Jaime
367	Bowers	Natalie	414	Brooke	Devin
368	Bowman	Jane	415	Brooke	James
369	Bowman	Kathleen	416	Brooke	Michael
370	Boyd	Amy	417	Brooker	James
371	Boydston	Lori	418	Brooker	Jim
372	Boyer	Julie	419	Brooks	Shawn
373	Boyle	Margaret	420	Brosnan	Abigail
374	Boyle	Michael	421	Brown	Annie
375	Boyle	Richard	422	Brown	Chris
376	Brackett	Mary	423	Brown	Darcey
377	Bradi	James	424	Brown	Duncan
378	Bradley	Kenn	425	Brown	Linda
379	Brady	Linda	426	Brown	Loraine
380	Bragdon	Elyse	427	Brown	Mickey
381	Braithwaite	Georgia	428	Brown	Peter
382	Braley	Bruce	429	Brown	Sheena
383	Brand	Charles	430	Browndog	Lila
384	Brandes	Susan	431	Brownell	Mara
385	Brandis	Debra	432	Browning	Marjorie
386	Brandon	Victoria	433	Bruce	Terah
387	Brandwein	Angel	434	Brundage	Joan and Alan
388	Brannon	Elizabeth	435	Brunner	Thomas
389	Brasch	Dorothy	436	Bruno	Leila
390	Brashear	Kathy	437	Bryan	Lori
391	Braudt	Thomas	438	Bryant	Kathleen
392	Braun	Clait E	439	Bryant	Ned
393	Brazie	Joe	440	Bryant	Valarie
394	Breihan	Lauren	441	Bucalo	Becky
395	Brendemuhl	Autumn	442	Buchan	William
396	Brennan	Tyler	443	Buchanan Trusdell	Kathy
397	Brennenman	Don	444	Bucher	Ingrid
398	Brent	Caroly	445	Buchheit	Kim
399	Brescia	Joseph	446	Buck	Barbara
400	Breslin	Jean	447	Buell	Nancy
401	Breunig	Robert	448	Buerge	Melyssa
402	Brewer	Anna	449	Buffington	Carol
403	Brewer	Lynn	450	Buila	Terry
404	Brezan	Barry	451	Bulla	Terry
405	Brian	Brian	452	Bumpus	Amy
406	Briggs	Sharon	453	Buntin	Simmons
407	Brink	Don	454	Burch	Allison
408	Brizuela	Sarah	455	Burch	Anderson
409	Broan	Andrew	456	Burchette	Laura
410	Brogan	Dan	457	Burd	Lori Ann
411	Brogden	Mette	458	Burg	Melissa

	Last Name	First Name		Last Name	First Name
459	Burgard	Brittany	506	Cannizzaro	Niyaso
460	Burgess	K.H.	507	Cannon	Barbara
461	Burgess	Martha	508	Cantor	Linda
462	Burke	Kathleen M	509	Caplan	Alan
463	Burke	Maureen	510	Caplan	Sarah
464	Burkhart	Janet	511	Caporicci	Karen
465	Burki	Criss	512	Cappa	Karen
466	Burleson	Winslow	513	Cappe	Madison
467	Burr	Brandon	514	Cara	Margherita
468	Burrows	Donna	515	Cardella	Sylvia
469	Burtis	David	516	Carey	Michael
470	Burton	Henry	517	Cargman	Jered
471	Burval	Daniel	518	Carini	Mara
472	Buskirk	Dale	519	Carlile	N
473	Busse	Grady	520	Carlock	Jacqueline
474	Bustamante	Amanda	521	Carlson	Brenda
475	Butler	Ava	522	Carlson	Gary
476	Butler	Gary	523	Carlson	Larry
477	Butler	Joan	524	Carlson	Leslie
478	Buursink	Winny	525	Carlson	Robin
479	Buyer	Ethan	526	Carlson	Marie-Christine
480	C	Claire	527	Carmean Floyd	Roxann
481	Cabanban	Linda	528	Carol	Bonnie
482	Cabanban	Robert	529	Carpenter	Julia
483	Cabello	Valeria	530	Carpenter	Barb
484	Cadonau	Sally	531	Carpenter	Barbara
485	Cahill	Victoria	532	Carr	Lauren
486	Calambro	Leslie	533	Carr	Walt
487	Caldwell	Charles	534	Carrero	Kathy
488	Caldwell	Joshua	535	Carrillo	Etna
489	Caldwell	Mary	536	Carroll	Robert
490	Caldwell	Caitlin	537	Carter	Kimberley
491	Call	Rachel	538	Carter	Thomas
492	Callaghan	Bryant	539	Cartwright	Carl
493	Callaghan	Sheri	540	Carvajal	Mauricio
494	Callahan	Michael	541	Casale	Mary E
495	Calvert	Dave	542	Casale	Joan L
496	Cambell	Barbara	543	Case	Christina
497	Cambron	Lisa	544	Casey	Sean
498	Cameron	Jean	545	Casey	Skylar
499	Camp	David	546	Cashel	Karlee
500	Campbell	Bruce	547	Cashman	Jordana
501	Campbell	June	548	Cassato	Candice
502	Camphire	Greg	549	Cassens	Susie
503	Canada	Deidre	550	Cassidy	Andrew
504	Canaday	Eva	551	Cassius	Liam
505	Canfield	Tana	552	Castaline	Myrna

	Last Name	First Name		Last Name	First Name
553	Castillo	Madai	600	Christian	Kathryn
554	Castner	Jessie	601	Christiana	David
555	Cate	Rachele	602	Christiansen	Martin
556	Cates	Barbara	603	Christie	Bill
557	Cathey	Margaret	604	Christie	Kyle
558	Cavallo	Janet	605	Christine	Chelsie
559	Cavanaugh	Sheri	606	Christy	Scott
560	Cecil	Grayson	607	Chuchvara	Marie
561	Cecil	Jon	608	Chumbley	James
562	Cecil	Michael	609	Church	Denis
563	Cederholm	Mark	610	Church	Denise
564	Celt	Adrienne	611	Ciaramitaro	Joseph
565	Cerjan	Talia	612	Cigainero	Juniper
566	Cervantez	Destiny	613	Cipolla	Vincent
567	Cervera	Isabel	614	Ciske	Sandra
568	Cezo	James	615	Citizen	Concerned
569	Cezo	Katie	616	Cizek	Karen
570	Chabrier	Kyle	617	Clapp	Jim
571	Chacon	Carmen	618	Clarendon	Mathew
572	Chaffin	Jenni	619	Clarida	Fran
573	Chagala	David	620	Clark	Brad
574	Chaggin	Jenni	621	Clark	Connie
575	Chaillie	Laura	622	Clark	Gayle
576	Chalker	Mikki	623	Clark	Joyce
577	Chambers	Sheila	624	Clark	Kent
578	Champagne	Sarah	625	Clark	Sylvia
579	Chan	Emily	626	Clarke	Suzanne
580	Chapman	Bridget	627	Clarkson	Debbit
581	Chapman	Hellene	628	Clavin	Tom
582	Charley	Roxann	629	Clay	Jessica
583	Charney	Karen	630	Clement	Monica
584	Chatwin	Corey	631	Clements	Dylan
585	Chave	Salissa	632	Clemment	Sally
586	Chavez	Stuart	633	Clendensen	Stefannie
587	Chavis	Anna	634	Clepper	Barbara
588	Cherrie	Chrysta	635	Cline	Lynn
589	Childs	Channing	636	Clinger	Sarah
590	Childs	Eugene	637	Cliver	Keith
591	Childs	Lonnie	638	Close	Lynne
592	Childs	Marilyn	639	Clusen	Chuck
593	Childs	Raymond	640	Clymer	Elliot
594	Chiotti	Lynnette	641	Cockrell	Jennifer
595	Chmel	Bob and Kim	642	Cody	Radmilla
596	Cholas	Chris	643	Cody	T. Stephen
597	Chorlton	David	644	Coenen	Rod
598	Christensen	Margaret	645	Coffey	Chris
599	Christian	Andrea	646	Coffman	Courtney

	Last Name	First Name		Last Name	First Name
647	Coffman	Kathy	694	Costa	Margarida
648	Coghlan	Patricia	695	Costa	Michael
649	Coglaiti	Carlene	696	Costion	Joe
650	Cohen	Harriet	697	Cotten	Kelly
651	Cohen	Howard	698	Cotter	Justina
652	Cohen	Jill	699	Cotts	Laura
653	Cohen	Peggy	700	Coughlin	John
654	Cohn	Charles	701	Coulter	Alan
655	Cohn	Janet	702	Councill	D
656	Colangelo	Annapoorne	703	Courtright	Caroline
657	Colangelo	Kim	704	Courtright	Ryan
658	Colatosti	Ryan	705	Cowan	Edward
659	Cole	Elena	706	Cowan	Larry
660	Cole	Martha	707	Cowden	Sheila
661	Cole	Tracy	708	Cowles	Emily
662	Colebank	Darryl	709	Cox	Holly
663	Coles-Ritchie	Marc	710	Cox	Joel
664	Collazo	Marie	711	Cox	Nanci
665	Collett	Merrill	712	Crabtree	Summer
666	Colletti	Kathy	713	Craig	Ann
667	Collier	Ken	714	Cranmer	Julia
668	Collins	Kathy	715	Crawford	Chelsea
669	Coloos	Brigitte	716	Crawford	Jon
670	Colpas	Marcie	717	Creswell	Richard
671	Colten	Lora	718	Crew	Tammy
672	Colvin	Ronnie	719	Crews	Michael
673	Con	Sal	720	Cribbins	Judy
674	Condella	Tess	721	Crider	Nancy
675	Conklin	Lu	722	Critchley	Ian
676	Conley	Michael	723	Crmkovich	Stephen
677	Conley	Patrick	724	Crnkovich	Stephen
678	Conner	Charles	725	Crockett	Paula
679	Conners	Marisa	726	Crockford	Brian
680	Conway	Robert	727	Croft	Alan
681	Cook	Nena	728	Croll	Danielle
682	Cook	Samuel	729	Cronin	Elizabeth
683	Cooke	Julie	730	Crook	Dustin
684	Cooter	Clifford	731	Crookston	Terry
685	Cope	Nate	732	Crookston	Theresa
686	Coplen	Randall	733	Crouch	Michael
687	Coproon	Hannah	734	Crowfoot	Hilma
688	Corbin	Linda	735	Cruz	Benjamin
689	Corey	William	736	Cruz	Carolyn
690	Corley	Bert	737	Cruz	Marian
691	Cornell	Linc	738	Cruz	Mary
692	Cornely	John	739	Csenge	Debra
693	Corriere	Sandra	740	Cucchi	Jessica

	Last Name	First Name		Last Name	First Name
741	Cucchiara	Caroline	788	Davis	Ansley
742	Cudd	Steven	789	Davis	Cooper
743	Cuellar	Dolores	790	Davis	Derrick
744	Cuen	Gabriela	791	Davis	Elizabeth
745	Cuozzo	Alexander	792	Davis	Helen
746	Curia	Peter	793	Davis	Jesica
747	Curlette	Diana	794	Davis	Leona
748	Currah	Nancy	795	Davis	Madeliaine
749	Curran	Mar	796	Davis	Richard
750	Currey	Bonnie	797	Davis	Rick
751	Curtis	Christine	798	Davis	Tom
752	Cushway	Warren	799	Dawson	Gerald
753	Cusick	Katy	800	Day	Joe
754	Cusick	Robin	801	De Berge	Suzanne
755	Cuttler	Karen	802	de la Cerda	Ian
756	Czapinski	Victoria	803	De La Garza	Jasmine
757	Czapp	Ferencz	804	de la Vista	Rio
758	Dahlgren	Tess	805	de Leon	Peria
759	Dahlman	Jill	806	Deal	Brandie
760	Dal Vera	Anne	807	Dean	Brandon
761	Dallman	Erica	808	Deane	Janelle
762	Dalton	Sadie	809	Deasy	Paul
763	Dalton-Nuvams	Doris	810	DeBoer	Natalie
764	Daly	Dorcas	811	DeBoer	Rachel
765	Dameron	Logan	812	Deck	Avis
766	Damus	M	813	Decou	Nermin
767	Dana	Sewall	814	Dee	Mike
768	Daniele	Renate	815	Dehn	Bill
769	Daniels	Marilyn	816	Dehn	William
770	Daniels	Mark	817	Del Rossi	Rachel
771	Danielson	Sydney	818	Del Vecchio	Cheryl
772	Dankwort	Rudolf	819	Dell	Patrica
773	Darby	Renee	820	Della Penta	Cathy
774	Dargen	Evan	821	Deltognoarmanasco	John
775	Darling	Anna	822	DeLuca	Theresa
776	Darling	Carrie	823	Demars	Sylvia
777	Darling	Roxanne	824	DeMuth	Lynn
778	Datcu	Ioana	825	Dennis	Kathryn
779	Daugherty	James	826	Denniston	Jay
780	Davenport	Tamara	827	Denny	Debby
781	David	Cassalyn	828	DeNunzio	Bruce
782	David	Gary	829	Dep	Christine
783	Davidson	Barbara	830	Deppman	Barbara
784	Davidson	Catherin	831	Derby	Alexandra
785	Davidson	Joseph	832	DeRussy	Glenn
786	Davidson	Lori	833	Desch	Samantha
787	Davies	Callie	834	Deschner	Ann Marie

	Last Name	First Name		Last Name	First Name
835	Deshotel	Shelley	882	Dow	Patricia
836	Desmond	Katie	883	Dowd	Thomas
837	DesRosiers	Ariane	884	Downey	Judith
838	deVall	Sue	885	Doyle	Kathleen
839	DeVecchio	Jacob	886	Drake	Carol
840	Devine	Jeanne	887	Draper	Kathryn
841	Devito	Mary	888	Dreste	Arlene
842	Dexter	Marie	889	Driscoll	Maria
843	Diamondstone	Esther	890	Driscoll	Marie
844	Diana	Duffy	891	Drozdoff	Martin
845	Diaz	Deanna	892	Duan	Lynn
846	Dibble	Steve	893	Dube	David
847	Dickerson	Danika	894	Dublinski	Jim
848	Dickie	Alexander	895	Dublinsli	James
849	Dickinson	Michael	896	DuBois	Jeff
850	Dickson	Lyle	897	DuCharme	Christy
851	Diedrich	Martin	898	Duda	Tim
852	Dierking	Lindsey	899	Dudenhoeffer	Eileen
853	Diesman	Laura	900	Duell	Brad
854	Dietrich	Cameron	901	Duesbery	Teah
855	Dille	Nancy	902	Duffy	Diana
856	Dillingham	Beth	903	Dugaw	Anne
857	Diodato	Amy	904	Duggan	Eric
858	DiPillo	Rachel	905	Dugi	Augustina
859	Dixon	John	906	Dukes	Thomas
860	Dobroslavic	B	907	Dunaetz	Neil
861	Dodge	Alex	908	Duncan	Alice
862	Dodson	Pamela	909	Duncan	Teresa
863	Dolleman	Sharon	910	Dunlop	Patrick
864	Dolnick	Cody	911	Dunn	Angela
865	Doman	Heidi	912	Dunn	Josheph
866	Donaghy	Howard	913	Dunne	Harold
867	Donald	John	914	Duran	Sarah
868	Donaldson	Leslie	915	Durrum	Kathy
869	Donnell	Bruce	916	Duster	George
870	Donovan	Stephan	917	DuVall	Dennis
871	Donovan	Stephan	918	Dworsky	Harlan
872	Dorn	Kathryn	919	Dyczko	K
873	Dorsch	Randall	920	Dyer	Dawn
874	Dosland	Britta	921	Dyer	Elizabeth
875	Doss	Summer	922	Eagle	War
876	Dotson	Virginia	923	Eames	Cheryl
877	Doug	Pilcher	924	Earl	Michael
878	Dougherty	Amy	925	Eastmead	Drew
879	Douglas	Diana	926	Eaton	Pamela
880	Douglas	Dianne	927	Eaton	Sheryl
881	Douglass	Amy	928	Ebarb	Kayla

	Last Name	First Name		Last Name	First Name
929	Ebbe	Kris	976	Epstein	Rob
930	Ebersole	Jayne	977	Erickson	Cami
931	Eccles	Rita	978	Erickson	Christopher
932	Eccleston	William	979	Erickson	Kathleen
933	Eck	Jj	980	Escobar	Nicolette
934	Eddings	Justin	981	Esigner	Stevie
935	Eddy	Lukas	982	Esparza	Grace
936	Edelstein	Andrew	983	Esparza-Harris	Janice
937	Edgar	Sharon	984	Espinosa	Gale
938	Edwards	Allain	985	Esque	Sandy
939	Edwards	Catherine	986	Estacion	Carlene
940	Edwards	Cynthia	987	Estarrona	Mikael
941	Egger	Tricia	988	Estrada	Christina
942	Egrie	Joan	989	Estrada	Jessica
943	Ehl	Michael	990	Estrella	Andrea
944	Ehmsen	Ron	991	Estrella	Marlena
945	Eich	Elizabeth	992	Eudy	Elaine
946	Eich	Ronald	993	Evans	Catherine
947	Eikenbary	Susan	994	Evans	Nick
948	Einhorn	Janet	995	Evans	Pamela
949	Eisenberg	Dr. Amy	996	Evans	Sandra
950	Eldracher	Danielle	997	Evans	Sarah
951	Eldridge	Dustin	998	Evans	Robert
952	Eldridge	Jennifer	999	Everhart	Noelle
953	Elise	Lynn	1000	Evers	Martha
954	Elizabeth	Kate	1001	Eyles	John
955	Elkenbary	Susan	1002	F	Julisa
956	Eller	Aisling	1003	Fabry	Michael
957	Ellett	William & Kathleen	1004	Face	Marcia
958	Elliott	Marshall	1005	Fachet	Patrick
959	Ellis	David	1006	Fahring	Rachel
960	Ellis	Laura	1007	Faich	Ron
961	Ellis	Mary Carlisle	1008	Failey	Arthur
962	Ellison	Margery	1009	Failing	Wayne
963	ElShwahyk	Jalila	1010	Faith	Sariah
964	Ely	Sheridan	1011	Falcon	Jenn
965	Emerson	Anneliese	1012	Falk	Larry
966	Emerson	Jan	1013	Falsetto	Charles
967	Emmer	Mathew	1014	Falsken	James
968	Emmert	Wendy	1015	Farina	Carol
969	Engdahl	Rae	1016	Farkas	Elizabeth
970	Englander	Carl	1017	Farrar	Valerie
971	Engle	I.	1018	Farrell	Chloe
972	Engler	Lillian	1019	Farris	Lawrence
973	English	Melissa	1020	Farrow	Rik
974	Enright	E	1021	Fass	Arline
975	Enright	Elizabeth	1022	Faulkner	Henry

	Last Name	First Name		Last Name	First Name
1023	Faust	John	1070	Fogleman	Maxwell
1024	Favel	Iktomi	1071	Foor	Susan
1025	Fawcett	Gay	1072	Forbes	Jim
1026	Fay	Alexa	1073	Ford	Isaiah
1027	Fechtel	Maggie	1074	Ford	Julie
1028	Fedirko-Unde	Taysia	1075	Forman	Fay
1029	Fegadel	Dr.	1076	Forman	Janet
1030	Feldman	Dr.	1077	Fornstrom	Cindy
1031	Feldstein	Stephanie	1078	Forsey	Dayle
1032	Felts	Terry	1079	Forster	Wendy
1033	Fennell	April	1080	Foster	Gwen
1034	Fenzel	Abigail	1081	Foster	Stephanie
1035	Feraru	Robert	1082	Fowler	Theodore
1036	Fergus	Jeri	1083	Fox	Bayard
1037	Ferguson	Alan	1084	Fox	Devon
1038	Ferguson	Linda	1085	Fox	Joaquin
1039	Ferguson	Tom	1086	Fox	Preston
1040	Fernande	Fournier	1087	Fox	Randal
1041	Ferraro	Monica	1088	Foxx	Jaqueline
1042	Fiarkoski	Paul	1089	Fraley	Dan
1043	Fierro Morales	Andres	1090	Franco	Sophia
1044	Figueroa	Alex	1091	Frank	Harriette
1045	Figueroa	Daniel	1092	Frank	Peggy
1046	Filipic	Randy	1093	Fraser	Josslyn
1047	Filleaudeau	Mrs. Andrienne	1094	Fraser	Kathy
1048	Filosa	Christine	1095	Fray	Linley
1049	Finando	Steve	1096	Frazier	Maggie
1050	Findley	Clarisa	1097	Frazier	Margaret
1051	Fine	Donna	1098	Frederick	Jay
1052	Fine	Jovita	1099	Frederiksen	Chris
1053	Finkelstein	Sheldon	1100	Freeman	Adrianna
1054	Fischer	Lise	1101	Freeman	Ashley
1055	Fisher	Taylor	1102	Freeman	Gregory
1056	Fishgold	James	1103	Freeman	Joseph
1057	Fisk	Cooper	1104	Freeman	Kenneth
1058	Fitzgerald	Anne	1105	Freer	Elizabeth
1059	Fitzpatrick	Sienna	1106	Freitas	Jesse
1060	Flake	Cheyenne	1107	Friedel	Adele
1061	Fleischmann	Paige	1108	Friedmann	Michael
1062	Fleming	John	1109	Friedrich	Howard
1063	Fleming	Susan	1110	Friel	Michael
1064	Fletcher	"	1111	Friesen	Debbie
1065	Floor	Mark	1112	Friestad	John
1066	Flores	George	1113	Frisby	Edd
1067	Flores	Joseph	1114	Frisby	Lo
1068	Flynn	Doug	1115	Frisella	Michele
1069	Flynn	Lois	1116	Frishman	Andry

	Last Name	First Name		Last Name	First Name
1117	Frizane	Paul	1164	Gamache	Mary
1118	Frodeman	Annie	1165	Gamboa	Melissa
1119	Frohardt	Katharine	1166	Gannon	Vicki
1120	Frohn	Joyce	1167	Garber	Pat
1121	Fromberg	Jeff	1168	Garcia	Alec
1122	Froning	Clayton	1169	Garcia	Andrea
1123	Frost	Chris	1170	Garcia	Cheyene
1124	Fry	Lauren	1171	Garcia	Maria
1125	Fuchs	Eileen	1172	Garcia	Ray
1126	Fugate	Lu	1173	Garibaldi de Luna	Maria
1127	Fuhrman	David	1174	Garlick	Kerrie-Ann
1128	Fuhst	Paula	1175	Garoutte	Claudia
1129	Fukuda	Kristina	1176	Gartin	Barbara
1130	Fukunaga	Judy	1177	Garwood	Georgie
1131	Fularczyk	Margaret	1178	Gary	Carol
1132	Fulgham	Kirsten	1179	Gates	Alan
1133	Fuller	Katelyn	1180	Gatlin	Mark
1134	Fuller	Kylie	1181	Gatto	Gina
1135	Fuller	Lori	1182	Gatton	Mike
1136	Funk	Adam	1183	Gaude	Kelsey
1137	Fuzman	Virginia	1184	Gaudy	Caroline
1138	G	Jessica	1185	Gawne	William
1139	G	Sydney	1186	Gay	Lauren
1140	Gabaldon	Carlos	1187	Geelhoed	Glenn
1141	Gacek	Piotr	1188	Geer	Susan
1142	Gaede	Marnie	1189	Geffan	Bruce
1143	Gaetz	Sara	1190	Gehlen	Patricia
1144	Gage	Beth	1191	Geil	Michelle
1145	Gagner	Paul	1192	Geiser	Melissa
1146	Gaiser	Stephen	1193	Gemind	Sara
1147	Gaither-Banch	Kelli	1194	Gemmer	Jessie
1148	Gaitis	Dawn	1195	Gendvil	Derek
1149	Galap	Simon	1196	Gennaro	Gina
1150	Galbavy	P	1197	George	Monika
1151	Galbraith	Daisy	1198	George	James
1152	Gale	Lora	1199	Georgieva	Anna
1153	Galiana	Max	1200	Gerbus	Rick
1154	Galla	Kathryn	1201	Gerdin	Marc
1155	Gallagher	Barbara	1202	Gerhart	Robert
1156	Gallagher	David	1203	Gers	Ryan
1157	Gallagher	Margaret	1204	Gervasi	Angela
1158	Gallant	Helena	1205	Getty	Joe
1159	Gallego	Yolanda	1206	Giambruno	Robert
1160	Gallo	Kristy	1207	Giardina	Mark
1161	Galloway	Neal	1208	Gibbons	Brian
1162	Galope	Megan	1209	Gibbs	Denise
1163	Galvez	Michelle	1210	Gibbs	Paul

	Last Name	First Name		Last Name	First Name
1211	Gibbs	William	1258	Golden	Mike
1212	Gibson	Duane	1259	Goldman	Dawn
1213	Gibson	Emily	1260	Goldman	Donal
1214	Gibson	Jody	1261	Goldsmith	Ken
1215	Gibson	Karen	1262	Goldstein	Colin
1216	Gibson	Kenneth	1263	Goldwater	Ty
1217	Gifford	Elizabeth	1264	Golser	Wolfgang
1218	Gilardi	Gary	1265	Goltz	Lori
1219	Gilbert	Liv	1266	Gomez	Victoria
1220	Gilbert	Pamela	1267	Gomez-Echegar	Pablo
1221	Gill	Samantha	1268	Gonder	Gloriac
1222	Gillenwater	Trol	1269	Gonzales	Helen
1223	Gillenwater	Troy	1270	Gonzales	Norma
1224	Gillet	Reyna	1271	Gonzalez	Camille
1225	Gillis	Patricia	1272	Gonzalez	Cesar
1226	Giloth	Greg	1273	Gonzalez	Lori
1227	Gimm	Phyllis	1274	Gonzalez	Stephanie
1228	Gioia	Tony	1275	Gonzalez	Stevie
1229	Giovale	Hilary	1276	Gonzalez	Veronica
1230	Giovanni	Dr.	1277	Good	Sharon
1231	Giron	Alex	1278	Goodberg	Robert
1232	Girshick	Lori B	1279	Goodman	Quinn
1233	Gitlin	Alicyn	1280	Goodrich	Rebecca
1234	Giunta	Liane	1281	Goodwin	Kevin
1235	Glaccum	Ellen	1282	Goodwin	Shaun
1236	Glass	Leslie	1283	Gordon	Marcy
1237	Glassburn	Carolyn	1284	Gorel	Danya
1238	Glavina	Vesna	1285	Gorman	Catherine
1239	Glenn	Caleb	1286	Gorostiza	Lucia
1240	Glenn	Rebecca	1287	Gorrin	Eugen
1241	Glider	Richard	1288	Gorski	Ilene
1242	Glineburg	Robert	1289	Gouvela	Carmen
1243	Glover	Janet	1290	Gowan	Mark
1244	Glover	Sydney	1291	Grady	Patrick
1245	Glow	Steve	1292	Graffagnino	MaryAnn &Frank
1246	Go	Suyen	1293	Graffanino	Mary Ann & Frank
1247	Goddard	Monica	1294	Grammatica	Arlo
1248	Godwin	Nancy K	1295	Granade	Victoria
1249	Godwin	Nancy	1296	Grange	Gary
1250	Goerke	Carol	1297	Granucci	Thmas
1251	Goetschel	Marissa	1298	Granville	Martin
1252	Goetz	Linda	1299	Graper	Barbara
1253	Goff	Elizabeth	1300	Grassel	LB
1254	Golas	Michael	1301	Graterol	Alejandro
1255	Golba	Tara	1302	Gray	Cameron
1256	Gold	Ilyse	1303	Gray	James
1257	Gold	Warren	1304	Gray	Millicent

	Last Name	First Name		Last Name	First Name
1305	Gray	Monica	1352	Gurvich	Susan
1306	Gray	Tom	1353	Gustagson	David
1307	Graziosa	Sara	1354	Gutfleisch	Ellen
1308	Greaves	Jean	1355	Guthrie	Elizabeth
1309	Green	Julia	1356	Guthrie	Shannon
1310	Green	Katherine	1357	Gutierrez	Gilberto
1311	Green	Martha	1358	H	Paige
1312	Green	Rax	1359	Haarr	Lars
1313	Greendorfer	Susan	1360	Hackos	JoAnn
1314	Greene	Nancy	1361	Hadcock	David
1315	Greenlee	Rayven	1362	Haddock	Sandy
1316	Green-Smith	Cole	1363	Hadland	Richardy
1317	Greenwood	Shannon	1364	Hafner	Amy
1318	Greer	Jeff	1365	Hagan	Krystel
1319	Greer	Kelsi	1366	Hagood	Christina
1320	Gregerson	Gary	1367	Haldeman	Katie
1321	Gregory	Ben	1368	Hale	Taylor
1322	Gregory	Linda	1369	Halgren	Samuel
1323	Greiner	Susan	1370	Hall	Carolyn
1324	Grenard	Mark	1371	Hall	Haley
1325	Grenard	Mark Hayduke	1372	Hall	Hannah
1326	Gricevich	Anne	1373	Hall	Holly
1327	Gricus	Elizabeth	1374	Hall	Matt
1328	Grider	David	1375	Halliday	Phyllis
1329	Gries	Ashley	1376	Halpern	Harvey
1330	Grieve	Andrew	1377	Halter	Janesa
1331	Grieves	Kathy	1378	Halter	Jenesa
1332	Griffith	Sandra	1379	Halversen	Susan
1333	Griggeory	Kristen	1380	Halverson	Joan
1334	Grimm	Phyllis	1381	Halvorsen	Peta
1335	Grimwood	Jaime	1382	Hamilton	Abby
1336	Grobelny	Julie	1383	Hamilton	Daniel
1337	Grosinger	Paul	1384	Hamilton	Dave
1338	Gross	Rebecca	1385	Hamilton	Irene
1339	Gross	Todd	1386	Hamilton	John
1340	Grove	Stephen	1387	Hamilton	Lynn
1341	Grubb	Carol	1388	Hamilton	Sarah
1342	Gruwell	Darlene	1389	Hamm	Cat
1343	Guarino	Ann	1390	Hamm	Chantel
1344	Guarnieri	Tony	1391	Hamm	Richard
1345	Guignard	Robert	1392	Hammack	David
1346	Gumerman	Elizabeth	1393	Hammond	Kelsey
1347	Gumerman	George	1394	Hammond	Sally
1348	Gunderson	Margaret	1395	Hammond	Stephanie
1349	Gunn	David	1396	Hand	Susan
1350	Gunn	Shirley	1397	Handforth	Michael
1351	Gupta	Anuj	1398	Haneline	William

	Last Name	First Name		Last Name	First Name
1399	Hanna	Sybil	1446	Hartman	Sara
1400	Hanneke	Anne	1447	Hartman	Sarah
1401	Hanneman	Paul	1448	Harvella-Tob	Sherry
1402	Hannigan	Bob	1449	Harvey	Avaya
1403	Hanold	Dena	1450	Harvey	Deborah
1404	Hansen	Dameon	1451	Harvey	Jo
1405	Hansen	Gina	1452	Harvey	Kurt
1406	Hansen	Julie	1453	Haskell	Christopher
1407	Hansen	Paige	1454	Haskell	Sarah
1408	Hansen	Sofia	1455	Hastings	Elizabeth
1409	Hanson	Art	1456	Hastings-Smi	Sydney
1410	Hanson	Barbara	1457	Hatchett	James
1411	Hanson	Ginger	1458	Hatfield	Patricia
1412	Hanson	Vickie	1459	Hathaway	Peter
1413	Harbert	Nancy	1460	Hausam	Tom
1414	Hardebeck	Larry	1461	Haverfield	Tiffany
1415	Hardebeck	Lawrence	1462	Haw	Dorene
1416	Hardenbergh	Sabrina	1463	Hawklee	Kay
1417	Harding	John	1464	Hawn	Judy
1418	Harding	Maggie	1465	Hawn	Judy
1419	Hardt	Elizabeth	1466	Hayduke	George
1420	Hardy	Michael	1467	Hayer	Alisha
1421	Harman	Nona	1468	Hayes	Amy
1422	Harmon	Dawn	1469	Hayes	Kenneth
1423	Harned	Jon	1470	Hayes	Leanna
1424	Harper	Kathryn	1471	Hayes	Sara
1425	Harrington	Sandra	1472	Hayes	Time
1426	Harrington	Susan	1473	Haynes	Rebecca
1427	Harrington	Susie	1474	Haywood	Sloane
1428	Harris	Brent	1475	Hazelton	Judith
1429	Harris	Carol	1476	Hazynski	Chris
1430	Harris	Freya	1477	Healy	Clarice
1431	Harris	Molly	1478	Heaning	Rich
1432	Harrison	James	1479	Heaps	Lynell
1433	Harrison	John	1480	Hearst	Kiley
1434	Harrison	Neil	1481	Heaton	Timothy
1435	Harrison	Vaughn	1482	Hebets	Lexine
1436	Harry	Sherry	1483	Heck	McKenna
1437	Hart	Beth	1484	Hed	Scott
1438	Hart	Dennis	1485	Heffernan	Dan
1439	Hart	Lyn	1486	Heflin	Stella
1440	Hart	Rob	1487	Heikens	Barabara
1441	Hart	Donna	1488	Heikens	Barbara
1442	Hartgraves	Paula	1489	Heisler	Katharine
1443	Hartly	Kevin	1490	Heitmann	Germar
1444	Hartman	Ashly	1491	Helin	Bruce & Nancy
1445	Hartman	Nancy	1492	Heller	Olya

	Last Name	First Name		Last Name	First Name
1493	Heller	Terri	1540	Hinton	Bill
1494	Hemmila	Rodney	1541	Hirt	Barbara
1495	Hemstreet	Steven	1542	Hitt	Amy
1496	Henderson	Emily	1543	Hobbs	Alexander
1497	Hendrick	James	1544	Hoch	James
1498	Hendricks	Brent	1545	Hoch	Jeffrey
1499	Hendricks	Kim	1546	Hoch	Lisa
1500	Hendricks	Sandra	1547	Hock	Louis
1501	Hendrickson	Margaret	1548	Hodes	David
1502	Henley	Barbara	1549	Hodge	Mark
1503	Henn	Mark	1550	Hodges	Sherri
1504	Hennigan	Patricia	1551	Hoeflin	Stephanie
1505	Henriksen	James	1552	Hoener	John
1506	Henry	Remony	1553	Hoffman	Char
1507	Hensel	Beth	1554	Hoffman	Susan
1508	Henson	Lana	1555	Hoffmann	Cristina
1509	Henzel	William	1556	Hoge	Christopher
1510	Herk	Mary	1557	Hoh	Erica
1511	Herman	Brandon	1558	Holcombe	Cassie
1512	Hermann	Birgit	1559	Holland	Ann
1513	Hernandez	Anneliese	1560	Holland	Kate
1514	Hernandez	Francisca James	1561	Holloman	Jennifer
1515	Hernandez	Justin	1562	Holloway	Jeffrey
1516	Hernández Gómez	Davinia	1563	Holm	Mary
1517	Hernesman	John	1564	Holm	Mary
1518	Herrera	Daniel	1565	Holmes	Jenny
1519	Herring	Timothy	1566	Holst	Mark
1520	Hershey-Lear	Chandra	1567	Holtrop	Hunter
1521	Herther	James	1568	Homer	Rona
1522	Hervatin	Shirley	1569	Honer-Orton	M.
1523	Herzog	Adrianne	1570	Hong	Celeste
1524	Heusinkyeld	Dominika	1571	Honga	Jewel
1525	Hibarger	Mariah	1572	Honigfort	Michael
1526	Hibben	T	1573	Hoogs	Lauren
1527	Hickerson	James	1574	Hope	Diane
1528	Hicks	Cynthia	1575	Hopkins	Teri
1529	Hicks	Lacey	1576	Horn	Jasmine
1530	Higgs	Brad	1577	Horn	Tara
1531	Hildebrandt	Melanie	1578	Horner	Christopher
1532	Hilkin	Danielle	1579	Horner	Zachary
1533	Hill	Alice	1580	Horner	Jenna
1534	Hill	Pamela	1581	Horstman	Patrice
1535	Hill	Sammie	1582	Horton	Dan
1536	Hill	Vanessa	1583	Horton	Daryl
1537	Hillman	Melita	1584	Horton	Deanna
1538	Hilton	Bryan	1585	Horton	Emma
1539	Hinson	Katherine	1586	Horwitz	Layne

	Last Name	First Name		Last Name	First Name
1587	Hotham	Sharon	1634	Huston	Guy
1588	Houghton	N	1635	Hutchins	David
1589	Hougland	Cynthia	1636	Hutchins	Katherine
1590	Houser	Dorothy	1637	Hutchinson	Elizabeth
1591	Houshower	Samuel	1638	Huth	Graciela
1592	Houston	Robert	1639	Hyer	Robert
1593	Houy	Charles	1640	Ianchiou	Peter
1594	Howard	Ashley	1641	Igard	Jodi
1595	Howe	Linda	1642	Imamura	Lynne
1596	Howell	Brittany	1643	Imbriano	Gabriela
1597	Howell	Shannon	1644	ImMasche	Sonia
1598	Howell	Virginia	1645	Incardone	Ashley
1599	Howlett	Debora	1646	Inderhees	Katherine
1600	Hoyt	Elizabeth	1647	Ingersoll	Roger
1601	Hubbell	Karen	1648	Inman	Dorothy Reed
1602	Huber	Kelsey	1649	Inzano	Lauren
1603	Hubert	Ron	1650	Irby	Drew
1604	Hubert	Ronald	1651	Ireland	Kara
1605	Huckaby	J	1652	Iris	Coral
1606	Huddy	Susan	1653	Isaacs	Kelly
1607	Hudson	Angela	1654	Ishikawa	John
1608	Hudson	Denise	1655	Ito	Brandon
1609	Hudson	Graylynn	1656	Ivich	Marco
1610	Hueske	Susan	1657	Ivy	Jacob
1611	Hufford	Carl	1658	Iyer	Anand
1612	Huggins	Barbara	1659	Jackson	Ben
1613	Huggins	Elizabeth	1660	Jackson	Benjamin
1614	Hughes	Aileen	1661	Jackson	Carolyn
1615	Hughes	Bill	1662	Jackson	Christina
1616	Hughes	Bonnie	1663	Jackson	Jalen
1617	Hughes	Candace	1664	Jackson	Jane
1618	Hughes	John	1665	Jackson	Nicole
1619	Hughes	Melvin	1666	Jackson	Robin
1620	Hughes	Michael	1667	Jackson	Shawn
1621	Hughes	Peggy	1668	Jackson	Thomas
1622	Hughes	Robert	1669	Jacob	Frank
1623	Huisenga	Pete	1670	Jacob	Jill
1624	Hulka	Kathryn	1671	Jacobs	Joan
1625	Hull	Lise	1672	Jacobsen	Barbara
1626	Huls	David	1673	Jacobson	Kelly
1627	Hunt	Donald	1674	Jacobson	Lisa
1628	Hunt	Myphon	1675	Jacobson	Susan
1629	Hunt	Tiffany	1676	Jaderborg	Beverly
1630	Hunter	Elizabeth	1677	Jajack	John
1631	Hunter	Tana	1678	James	Charles
1632	Hupperts	Connie	1679	James	David
1633	Hurst	Patricia	1680	James	Ian

	Last Name	First Name		Last Name	First Name
1681	James	Peyton	1728	Jones	Debbie
1682	James	Phillip	1729	Jones	Debra
1683	Janke	Eilene	1730	Jones	Denise
1684	Janke	Susan	1731	Jones	Gary
1685	Janowitz-Price	Beverly	1732	Jones	Jo
1686	January	Geraldine	1733	Jones	Joshua
1687	Jara	Wendie	1734	Jones	Ken
1688	Jarboe	JoLynn	1735	Jones	Lorraine
1689	Jarvis	J. Brad	1736	Jones	Mary Ann
1690	Jarvis	Jon	1737	Jones	Ola
1691	Jarvis	Marsha	1738	Jones	Richard
1692	Jason	Eman	1739	Jones	Sharon
1693	Jeffery	Allison	1740	Jones	Tevin
1694	Jenkins	Andrew	1741	Joosten	Anne
1695	Jenkins	David	1742	Jordan	Lois
1696	Jenkins	Mark	1743	Jordan	Mark
1697	Jenkins	Teresa	1744	Jorling	Jeff
1698	Jenkins	Vince	1745	Joyce	Caroline
1699	Jennings	Dan	1746	Julien	Judith
1700	Jennings	Linda	1747	Julien	Nicole
1701	Jensen	Cornelia	1748	Julien	Spencer
1702	Jensen	Deborah	1749	Kaczmarek	Anna
1703	Jensen	Marietta	1750	Kadlubowska	Aga
1704	Jensen	Tiana	1751	Kadrich	Peter
1705	Jepson	Marcia	1752	Kaemerer	Casey
1706	Jernigan	Sally	1753	Kafer	Norma
1707	Jespersen	Elizabeth	1754	Kaffer	Kathryn
1708	Jessup	Sarah	1755	Kalen	Vicki
1709	Jimenez	Francesca	1756	Kalinowski	Libby
1710	Johansen	Bill	1757	Kalloch	Terri
1711	Johanson	Erica	1758	Kamm	Dorothy
1712	Johanson	Erika	1759	Kamper	Ryan
1713	Johnson	Ana	1760	Kanarish	Lisa
1714	Johnson	Godlind	1761	Kanno	Tracy
1715	Johnson	Holly	1762	Kapetanakis	Voulel
1716	Johnson	Howard	1763	Kaplan	Peter
1717	Johnson	Kyle	1764	Kapner	Jamie
1718	Johnson	Mark	1765	Karlen	Karima
1719	Johnson	Pamela	1766	Karluk	Madeleine
1720	Johnson	Philip	1767	Karner	Mary
1721	Johnson	Tina	1768	Karnia	Judy
1722	Johnson	Vicki	1769	Kasulka	Hannah
1723	Johnson-Kerr	Jenifier	1770	Kater	Norma
1724	Johnston	Erika	1771	Katten	DC
1725	Johnston	Olga	1772	Katten	Jersey
1726	Jones	Betti	1773	Katz	David
1727	Jones	Brian	1774	Katzmar	Tyler

	Last Name	First Name		Last Name	First Name
1775	Kauffman	Jerry	1822	Kiernan	Carley
1776	Kaufman	Louise	1823	Kiholm	Laura
1777	Kea	Ruth	1824	Killian	Karissa
1778	Keable	Edward	1825	Kim	Ji-Young
1779	Keafer	Trina	1826	Kimble	Paige
1780	Kearney	Mary	1827	Kimes	Leticia
1781	Kearns	Deb	1828	Kinard	Thom
1782	Kearsley	Hailey	1829	King	Brianna
1783	Kearsley	Lisa	1830	King	Eugenia
1784	Keegan	Clarice	1831	King	Jean
1785	Keenan	JoAnn	1832	King	Jeanette
1786	Keene	Patrica	1833	King	Kaye
1787	Keiley	Lily	1834	King	Sarah
1788	Keir	Gary	1835	Kinne-Herman	Karen
1789	Keller	Annette	1836	Kinscherff	Jonathan
1790	Keller	Drew	1837	Kinsey	Jeff
1791	Keller	Mary Alice	1838	Kinslinger	Elizabeth
1792	Kelley	Megan	1839	Kirchner	John
1793	Kelley	Patrick	1840	Kirk	Rebecca
1794	Kelly	Tanya	1841	Kirkley	John
1795	Kelso	Kerry C.	1842	Kirsch	Matt
1796	Kelzenberg	Gary	1843	Kirschiling	Karen
1797	Kemmerer	Carol	1844	Kish	Dawn
1798	Kendall	Dr. M	1845	Kisner	Al
1799	Kendall	Mary	1846	Klaff	Harry
1800	Kendrick	Joanne	1847	Klass	Laura
1801	Kennedy	Nancy	1848	Klawiter	Michelle
1802	Kennedy	Richardy	1849	Kleber	Keith
1803	Kennedy Ice	Mary	1850	Klein	Andrew
1804	Kenner	Kate	1851	Klein	Janice
1805	Kent	Diana	1852	Klein	Kelyn
1806	Kent	Diane	1853	Klein	Lucas
1807	Kentfield	Maren	1854	Klein	Mark
1808	Kerata	Jan	1855	Klein	Stuart
1809	Kerkhof	Kara	1856	Klema	Matthew
1810	Kershner	Camille	1857	Klement	Susan
1811	Kerstner	Patricia	1858	Klemme	Chyenne
1812	Kessler	Tom	1859	Klett	Lena
1813	Kester	Lenore	1860	Klett	Natalie
1814	Kewenvoyouma	Kristie	1861	Kling	Dianne
1815	Keyes	Colleen	1862	Knapp	Michael
1816	Khan	Rosie	1863	Kneeland	Suzanne
1817	Khazai	Carol	1864	Knoll	Kris
1818	Khurshid	Marwa	1865	Knott	Marion
1819	Kidston	Martin	1866	Knous	Rick
1820	Kieckhaefer	Cindy	1867	Knowles	Maya
1821	Kieffer	Ramsay	1868	Knox	Charlotte

	Last Name	First Name		Last Name	First Name
1869	Knuth	Lilly	1916	Krukowski	Kira
1870	Knutsen	Maureen	1917	Krznarich	Cindy
1871	Kobak	Janice	1918	Kuelper	Carol
1872	Koch	Brandon	1919	Kueth	Changkuoth
1873	Koechner	Donna	1920	Kueth	Nyajuok
1874	Koehnlein	Britt	1921	Kugler	Rose
1875	Koeniger	Zoe	1922	Kuhlenbeck	Lena
1876	Koenitzer	Marilyn	1923	Kuiper	James
1877	Koff	Marilyn	1924	Kukkonen	Holly
1878	Kohany	Patty	1925	Kulesza	Grace
1879	Kohmann	M	1926	Kulish	Clement
1880	Koller	Jed	1927	Kurek	Tracy
1881	Komadina	Marc	1928	Kurtz	Ken
1882	Konuch	Robert	1929	Kurucz	Laszlo
1883	Koons	Janet	1930	Kush	Lynn
1884	Koopman	Elizabeth	1931	Kuster	Chris
1885	Kopanda	Bill	1932	Kuwanisiwma	Leigh
1886	Koritz	Raleigh	1933	Kvaas	Bob
1887	Korn	Cynthia	1934	Kvaas	Robert
1888	Kosmicki	E	1935	Kwok	Kelly
1889	Kotzin	Joseph	1936	Kyriakopulos	Jill
1890	Kovash	Chris	1937	Laberge	Lucie
1891	Kovshun	Rita	1938	Labiner	David and Janis
1892	Kracen	Laurel	1939	LaChance	Denise
1893	Krall	Sarah	1940	Lachhman	Rachel
1894	Kramer	Ann	1941	Lachot	Magali
1895	Krause	Glenda	1942	Lacinak	Juluie
1896	Krause	Liana	1943	Lackey	Mercedes
1897	Krause	Monica	1944	Lackner	Kristen
1898	Krause	Sandra	1945	Lacome	Michael
1899	Krause	Glenda	1946	Laevey	Susan
1900	Krauss	Brian	1947	Laferriere	Kenneth
1901	Kravcov Malcolm	Karen	1948	LaGro	Elizabeth
1902	Krch	Pamela	1949	Lahr	Jessica
1903	Kreamer	David	1950	LaLond	Sharon
1904	Kreifels	Michele	1951	Lambertz	Larry
1905	Kreuser	Tom	1952	Lambeth	Jennifer
1906	Kriebl	Olivia	1953	Lambrechtse	Rudolf
1907	Krinks	Jerralynn	1954	Lameman	Derrick
1908	Krok	Kim	1955	Lamothe	Susie
1909	Kroll	Christian	1956	Lamson	Kate
1910	Krone	Timothy	1957	Landa	Alana
1911	Kross	Kevin	1958	Landabazo	Carlos
1912	Krueger	Juliane	1959	Landau	Doug
1913	Krueger	Nathan	1960	Lane	Debra
1914	Krueger	Richard	1961	Lane	Paula
1915	Kruger	Cynthia	1962	Lane-Pumphrey	Brinda

	Last Name	First Name		Last Name	First Name
1963	Lang	Katarina	2010	Lee	Mia
1964	Lang	Rachael	2011	Lee	Michael
1965	Lang	Scott	2012	Lee	Y
1966	Langmade	Laurel	2013	Lee	Kenneth
1967	Langstaff	Larry	2014	Lee	Virginia
1968	Lankford	Matt	2015	Lee Steele	Donna
1969	Lansing	Amber	2016	Leeder	Cynthia
1970	LaPlante	Angelina	2017	Lees	Walter
1971	LaPointe	Drena	2018	Lefebvre	Peter
1972	Lapointe	Kenneth	2019	Lefler	Susan
1973	Lara	Martin	2020	Leggett	Dee
1974	Lara	Sarai	2021	Leggett	Robert
1975	Largay	John	2022	LeGoullon	Laura
1976	Largo	Shandiin	2023	Lehmann	Tanja
1977	Larkin	Arwyn	2024	Lehmer	Robert
1978	Larkin	Kim	2025	Leighton	Sandra
1979	Larramendy	Kate	2026	Lempicki	David
1980	Larsen	Nicholas	2027	Lenhart	Terri
1981	Larson	Ken	2028	Lennon	Tim
1982	Larson-Whitta	Cole	2029	Lenz	Danielle
1983	LaSchiava	Dona	2030	Leon	Marjorie
1984	Lasiloo	John	2031	Leon	Peter
1985	Laspisa	Cecilia	2032	Leonard	Cami
1986	Lassandrello	Noreen	2033	Leonard	Fred
1987	Lassiter	Carly	2034	Leone	Juanita
1988	Latsch	Mike	2035	Lepin	Larry
1989	Lauren	Nicole	2036	Lequient	Magali
1990	Laurenitis	Diana	2037	Leskovar	Abby
1991	Lavinder	Gary	2038	Leszcaynski	M
1992	Lavoie	Bruce	2039	Leszczynski	M
1993	Lavoy	Hannah	2040	Letourneau	Philippe
1994	Lawerence	Robert	2041	Letze	Rachel
1995	Lawless	Tamara	2042	Levandowski	Michael
1996	Lawrence	Ashley	2043	Leverett	Pamela
1997	Lawrence	Jay	2044	Levick	Lainie
1998	Lawrence	Karen	2045	Levin	Beth
1999	Lawrence	Rob	2046	Levin	Debra
2000	Lazowick	Alan	2047	Leviton	Peggy
2001	Le Tourneau	Alice	2048	Levstik	Erin
2002	Lear	Kirsten	2049	Levy	Arthur
2003	Leas	Rebecca	2050	Levy	Ellen
2004	Leathers	Catherine	2051	Levy	Leslie
2005	Lebar	Jon	2052	Lewis	Catherine
2006	Lee	Barbara	2053	Lewis	Duane
2007	Lee	Dana	2054	Lewis	M
2008	Lee	Dong	2055	Lewis	Randy
2009	Lee	Jayne	2056	Lieber	Lori

	Last Name	First Name		Last Name	First Name
2057	Lieber	Lysbeth	2104	Lopez	Marco
2058	Liebermann	Jerry	2105	Loucks	Cynthia
2059	Lierman	Milly	2106	Loucks	Tristan
2060	Lieurance	Francelia	2107	Loughridge	Bonnie
2061	Light	Lori	2108	Loui	Rachel
2062	Lill	Nancy	2109	Lovatt	Sarah
2063	Lillie	Sarah	2110	Love	Marigold
2064	Lillywhite	Lesley	2111	Lovejoy	David
2065	Lim	Christine	2112	Lovelace	Lanelle
2066	Lin	Briana	2113	Loveland	Jim
2067	Linda	John	2114	Lowery	Candice
2068	Link-New	Virgene	2115	Lowery	Karen
2069	Linton	Cynthia	2116	Lowes	Russell
2070	Lipp	Alexandra	2117	Loy	Janet
2071	Lipp	Geraldine	2118	Lu	Nianqin
2072	Lippert	Timothy	2119	Lucchitta	Dr. I
2073	Liscomb	Ivy	2120	Luce	Mark
2074	Lish	Chris	2121	Lucore	Bryan
2075	Lish	Christopher	2122	Lueck-Mammen	Rosalyn
2076	Lissner	Sidney	2123	Luehrmann	Paul
2077	Littith	Ms	2124	Luepke	John
2078	Littleman	Lawrence	2125	Luetkemeier	Kristen
2079	Littleman	Tina	2126	Luevano	Stacey
2080	Lloyd	Mary	2127	Lujic	Katarina
2081	Lobdell	Sydney	2128	Lumley	Harry
2082	Lobel	Colleen	2129	Luna	Bunny
2083	LoCicero-Walsh	Jessica	2130	Lundin	David
2084	Lock	Roger	2131	Luong	Cathy
2085	Lockwood	Vicky	2132	Lupo	Thomas
2086	Loechell	Niels	2133	Lykins	Jim
2087	Loehlein	Kenneth	2134	Lyman	Teresa
2088	Logan	Joyce	2135	Lynn	Andy
2089	Logsdon	Vanessa	2136	Lyon	Phil
2090	Logue	Michaelyn	2137	Lytle	Denise
2091	Lohr	Margaret	2138	M	Michelene-Mychel
2092	Lohr	Mary	2139	Mac Nish	Robert
2093	Lomeli	Ben	2140	MacCalman	Kirsty
2094	Long	Bob	2141	MacCarthy	Robert
2095	Long	Larry	2142	MacDonald	Joan
2096	Long	Leland	2143	MacIntosh	Chris
2097	Loomis	Cindy	2144	Mackay	Bonnie
2098	Loos	Gary	2145	MacKenzie	Susan
2099	Loosli	Maureen	2146	Mackey	Donald
2100	Lopez	Audrey	2147	Mackiewicz	Frances
2101	Lopez	Dolores	2148	Maclasaac	Zoe
2102	Lopez	Jose	2149	MacNeil	D'Anne
2103	Lopez	Julio	2150	Madden	Ed

	Last Name	First Name		Last Name	First Name
2151	Mader	Thomas	2198	Marsik	George
2152	Madson	James	2199	Marsis	Elizabeth
2153	Maes	Chrissy	2200	Martin	Carolyn
2154	Maestro	Betsy	2201	Martin	Glen
2155	Magana	Jesse	2202	Martin	Ken
2156	Magana	Maria	2203	Martin	Riley
2157	Magda	Stacey	2204	Martin	Ruth
2158	Mager	Nance	2205	Martin	Shannon
2159	Maggs	Robert	2206	Martin	Theresa
2160	Magness	Rose	2207	Martin	Valerie
2161	Mahaffy	Lorrence	2208	Martin III	Robert
2162	Malcolm	Karen	2209	Martines	Joseph
2163	Mallon	Claudia	2210	Martinez	Emmaleigh
2164	Mallory	Victor	2211	Martinez	Jacqueline
2165	Malone	Andree	2212	Martinez	Johanna
2166	Malone	Lindsay	2213	Martinez	Laura
2167	Malven	Tania	2214	Martinez	Mathew
2168	Mamich	Susan	2215	Martinez	Ray
2169	Man	Cave	2216	Martini	Denise
2170	Manchester	Maggie	2217	Martin-Jen	Danielle
2171	Manchester	Margaret	2218	Martz	Kristen
2172	Mandler	James	2219	Marx	David
2173	Manek	Michael	2220	Marx	James
2174	Mangan	Gary	2221	Mason	Cynthia
2175	Manheimer	Khalilah	2222	Mason	Kathy
2176	Mann	Clinton	2223	Mason	Leslie
2177	Manning	Kaitilin	2224	Masser	Joel
2178	Mansfield	Emily	2225	Massey	Carolyn
2179	Manzer	Marlene	2226	Massie	Sherry
2180	Marc	Beacuchamp	2227	Massman	John
2181	Mardigian	Sandra	2228	Mastikhina	Sofia
2182	Marek	Michael	2229	Masuoka	Tami
2183	Marie	Chris	2230	Mathes	Barbara
2184	Marino	Andrea	2231	Mathews	Fulvia
2185	Marish	Elka	2232	Mathews	Mary
2186	Mark	Mulligan	2233	Mathews	Meredith
2187	Mark	Robert	2234	Mathieson	Scott
2188	Marks	Christopher	2235	Matson	Joanne
2189	Marks	Jane	2236	Matter	Margie
2190	Markwell	Baylee	2237	Mattingly	Georgia
2191	Marlatt	Michael	2238	Maurilello	Megan
2192	Marley	Yvonne	2239	Maves	Alena
2193	Marne	Marielle	2240	Max	Patricia
2194	Marquart	Jane	2241	May	Elizabeth
2195	Marrero	Ana	2242	May	Kalina
2196	Marriott	Pat	2243	Mayer	Paul
2197	Marsh	Kathleen	2244	Maynard	Paul

	Last Name	First Name		Last Name	First Name
2245	Mayol	Richard	2292	McKaskle	Troy
2246	Maytum	Shaina	2293	McKee	Brian
2247	Mazuji	Nasrin	2294	McKee	Sarah
2248	Mazzola	Lisa	2295	McKelvie	Patricia
2249	Mcafner	Dave	2296	McKenney	Cherokee
2250	McAlarney	Kelsey	2297	McKenzie	Mary
2251	McAllister	Laurel	2298	McKinnon	Taylor
2252	McCabe	Donna	2299	McLane	Kathleen
2253	McCann	Casey	2300	McLane	Richard
2254	McCarter	David	2301	McLellan	Wayne
2255	McCarthy	Elizabeth	2302	McMahon	Annie
2256	McCarthy	Erinn	2303	McMaster	Melissa
2257	McCarthy	Jim	2304	McMorrow	Philip
2258	McCauley	Sandra	2305	McMullan	Cayla
2259	McCawley	Mary	2306	McMullen	Colleen
2260	McClure	James	2307	McNamara	Anita
2261	McCollum	Sudi	2308	McPhee	Gordon
2262	McCormick	Gary	2309	McQueen	Catherine
2263	McCormick	Janelle	2310	McRae	Theresa
2264	McCormick	Suzanne	2311	McShane	Mari
2265	McCown	Lena	2312	McWright	Matt
2266	Mccready	Tami	2313	MD	Jessica
2267	McCreedy	Tamara	2314	MD	Tom
2268	McCroskey	Jeff	2315	Meade	Alayn
2269	McCune	Bonnie	2316	Means	Andrew
2270	McCutchan	Mary	2317	Medus	Diane
2271	McDaniel	Les	2318	Meek	June
2272	McDaniel	PJ	2319	Meeks	Mark
2273	McDaniel	Roy	2320	Mekertichyan	David
2274	McDermott	Bob	2321	Melgarejo	Aurelio
2275	McDonald	Charles	2322	Mello	Phillip
2276	McDonald	Hillary	2323	Mellor	Paul
2277	McDonald	Pat	2324	Melzer	Dan
2278	McDonald	Patricia	2325	Mencik	Jitka
2279	McDonough-Means	Sharon	2326	Mendenhall	Barbara
2280	McDougall	Patricia	2327	Mendes	Ron
2281	McDowell	Danny	2328	Menor	"
2282	McDowell	Hannah	2329	Mercer	Leslie
2283	McDowell	Helen	2330	Mergen	David
2284	McFletcher	Liselle	2331	Merin	Lizzy
2285	McGee	Brian	2332	Merrell	Dean
2286	McGee	Degs	2333	Merritt	Jeri
2287	McGee	Maureen	2334	Mers	Mike
2288	McGinn	Chris	2335	Merz	Teresa
2289	McGrath	Dominic	2336	Merz	Terri
2290	McGuffin	Pat	2337	Messina	Patricia
2291	McGuffin	Patrick	2338	Messing	Luci

	Last Name	First Name		Last Name	First Name
2339	Messinger	David	2386	Miller-White	Davida
2340	Metz	Barb	2387	Millett	Peg
2341	Metzinger	Karen	2388	Milliken	Gerry
2342	Meyer	Eric	2389	Mills	David
2343	Meyer	Lisa	2390	Mills	Pamela
2344	Meyer	Marla	2391	Mills	Shirly
2345	Meyers	Jeffrey	2392	Milner	Joan
2346	Meyers	Lynn	2393	Milone	Sophia
2347	Mezieres	Linda	2394	Mineo	Robert
2348	Miano	Janice	2395	Mirarchi	Melissa
2349	Michaels	Joe	2396	Mirolli	Gene
2350	Michaloski	Joe	2397	Mitchel	John
2351	Michaud	Lizann	2398	Mitchell	Marie
2352	Michaud	Barbara	2399	Mitchell	Pamela
2353	Michel	Marina	2400	Mizar	Robert
2354	Middaugh	Linda	2401	Mobley	Liisa
2355	Middleton	Kent	2402	Moehlman	Bruce
2356	Middleton	Layne	2403	Mohr	Elieen
2357	Midgley	Jon	2404	Molinar	Gerald
2358	Miele	Mary	2405	Moll	Jonathan
2359	Miiller	Wayne	2406	Molloy	Molly
2360	Mik	Mo	2407	Molsberry	Bailie
2361	Mikkelsen	David	2408	Mondragon	April
2362	Milam	Haley	2409	Mondragon	Michelle
2363	Milan	Shea	2410	Monney	Taylor
2364	Miles	Julie	2411	Montalvo	Monica
2365	Milich	Lenard	2412	Montarelli	Frank
2366	Milillo	Michael	2413	Montgomery	Lily
2367	Mililo	Michael	2414	Moody	Erin
2368	Millar	Sue	2415	Mooney	Linda
2369	Millemaci	Mary	2416	Moonshadow	Ms
2370	Miller	Barbara	2417	Moor	Judy
2371	Miller	Carmen	2418	Moore	Allison
2372	Miller	David	2419	Moore	Jennifer
2373	Miller	Deanna	2420	Moore	Jill
2374	Miller	Emily	2421	Moore	Michael
2375	Miller	John E	2422	Moore	Susan
2376	Miller	Michael	2423	Morada	Isabella
2377	Miller	Norma	2424	Moran	Kiera
2378	Miller	Richard	2425	Moran	Mary
2379	Miller	Robert	2426	Moray	Torin
2380	Miller	Sara	2427	More	Mary
2381	Miller	Steven	2428	Morehead	Mark
2382	Miller	Sue	2429	Moreley	Amanda
2383	Miller	Valerie	2430	Morgan	Alexa
2384	Miller	Zoe	2431	Morgan	Deidra
2385	Miller	Moira	2432	Morgan	Meredith

	Last Name	First Name		Last Name	First Name
2433	Morgan	Michael	2480	Murov	Marilyn
2434	Morgan	Robert	2481	Murphy	Cynthia
2435	Morillo	Kleys	2482	Murphy	Lynn
2436	Morillo	Sofia	2483	Murphy	Dacia
2437	Morin	Carla	2484	Murphy-Young	Paige
2438	Morison	Emily	2485	Murrary	Fred
2439	Moritz	Stefanie	2486	Musial	Kathy
2440	Morley	Bill	2487	Musta	Emil
2441	Morris	Andy	2488	Myers	Alex
2442	Morrison	Gloria	2489	Myers	Allison
2443	Morrison	Jeanne	2490	Myers	Jon
2444	Morrow	Peter	2491	Myers	Sarah
2445	Moschopoulos	Charity	2492	Myers	Wanda
2446	Moser	Amy	2493	Mylet	Megan
2447	Moser	Rich	2494	Myones	Zachary
2448	Mospan	John	2495	Myrtle	Twizted
2449	Mospan	Tara	2496	Nadauuld	Daisy
2450	Moss	Jim	2497	Nagel	Dennis
2451	Moss	Lee	2498	Nagy	Kellie
2452	Mottl	Henry	2499	Naiberg	Dennis
2453	Moulton	Jamie	2500	Nakhai	Mandana
2454	Mouras	Melanie	2501	Nally	Steph
2455	Mowbray	David	2502	Name	No
2456	Mrray	Larry	2503	Napoletano	Denice
2457	Mudick	Anni	2504	Nappa	Steve
2458	Mueller	Kiefer	2505	Nash	Jordan
2459	Mueller	Melinda	2506	Nasif	Marcelo
2460	Mugglestone	Lindsay	2507	Nasirulla	Mohammad
2461	Mulcahy	Lucas	2508	Nassar	Crystal
2462	Mulcahy	Susan	2509	Natiello	Robert
2463	Mulcare	James	2510	Natrop	JoAnne
2464	Muldoon	Christin	2511	Naughton	Carrie
2465	Mulford	Rosie	2512	Navarro	Eleanor
2466	Mullaney	Teresa	2513	Nazzaro	Patricia
2467	Mullarkey	T	2514	Neathammer	Michelle
2468	Mullen	Amy	2515	Nedeau	James
2469	Mullen-Schultz	Gary	2516	Neff	Grace
2470	Mulligan	Robin	2517	Neher	Dan
2471	Mundee	Jennifer	2518	Neils	A.
2472	Mundy	Jaye	2519	Nelsen	George
2473	Munoz	Aura	2520	Nelson	Brenda
2474	Munoz	Diana	2521	Nelson	Brett
2475	Munsey	Hampton	2522	Nelson	David
2476	Munves	Sol	2523	Nelson	George
2477	Munz	Carl	2524	Nelson	Jake
2478	Murdock	Kevin	2525	Nelson	Jarrod
2479	Murillo	Karmina	2526	Nelson	Mathew

	Last Name	First Name		Last Name	First Name
2527	Nelson	Michael	2574	Nowak	Robert
2528	Nelson-Turner	Madison	2575	Nowell	Anita
2529	Nequatewa	Bryson	2576	Nowlan	Donna
2530	Nerio	Lisa	2577	Nuss	Kathleen
2531	Netzky	Jonathan	2578	Nuvayestewa	Dawn
2532	Neu	Kelly	2579	Nyberg	Julie
2533	Neville	Bruce	2580	Nyman	Leslie
2534	Neville	John	2581	Nyren	Robert
2535	Nevins	Laura	2582	Oaks	Barry
2536	Newcomer	Priscilla	2583	O'Brian	Ashley
2537	Newman	Jacomina	2584	Obrien	John
2538	Newman-Osmon	Jacomina	2585	OBrien	Rachel
2539	Newton	Dorothy	2586	O'Brien	Lee
2540	Newton	Eugenie	2587	O'Brien	Rachel
2541	Newton	Gabriel	2588	O'Connell	Novy
2542	Ng	Karen	2589	O'Connor	Martha
2543	Nguyen	Meggie	2590	O'Connor	Robert
2544	Nichols	David	2591	ODaniel	Taylor
2545	Nichols	Ella	2592	ODonnell	J
2546	Nichols	Kaden	2593	O'Donoghue	James
2547	Nicholson	Bruce	2594	Offringa	Lauren
2548	Nicholson	Stephen	2595	Ogonowski	Mark
2549	Nickum	John	2596	Ohanlon	Thomas
2550	Nicolson	Audrey	2597	OHara	Kristen
2551	Nielsen	Nancy	2598	Ohrman	Sheena
2552	Nilsen	Beate	2599	Okeefe	Mary Louise
2553	Nistler	Aubrey	2600	O'Kelly	Christine
2554	Nock	Jeff	2601	Oken	Tom
2555	Noecker	Ross	2602	Okmen	Sophie
2556	Noel	Bronc	2603	Okolowcz	Sofia
2557	Noel	Richard	2604	Okolowicz	Sofia
2558	Noell	Silvia	2605	Olave Rodriguez	Maria
2559	Nolan	Kate	2606	Oleson	Evan
2560	Noll	Sharon	2607	Olin	Bonnie
2561	Noonan	Ava	2608	Olivas	Maria
2562	Noonan	Marua	2609	Oliver	Bonnie
2563	Noorzi	Madina	2610	Oliver	Shaina
2564	Nordgren	Julia	2611	Olpin	Maia
2565	Norman	Gina	2612	Olsen	Dr.
2566	Norman	Sonya	2613	Olsen	Rhesa
2567	Normand	Jacqueline	2614	Olson	Paula
2568	Notestine	James	2615	Olson	Ron
2569	Nottingham	Lois	2616	Olson	Sherry
2570	Nourse	Jeanne	2617	Olsson	Leslie
2571	Nowak	Diana	2618	O'Neal	Maureen
2572	Nowak	Diane	2619	Ontiveros	Corrina
2573	Nowak	John	2620	Ordonez	Rose

	Last Name	First Name		Last Name	First Name
2621	Ordway	Sue	2668	Palmer	Patrick
2622	Orf	Madeline	2669	Palmer	Sherry
2623	Orinstein	Bruce	2670	Palmer	Tamara
2624	Orkney	Garth	2671	Palmer	Tim
2625	O'Rourke	Melissa	2672	Pan	Pinkyjain
2626	Orozco	Zuhaila	2673	Panikker	Mitesh
2627	Orr	Andrew	2674	Pannoni	Sarah
2628	Orr	Christine	2675	Papermaster	Cynthia
2629	Orr	Duncan	2676	Pappin	Judith
2630	Orr	Nancy	2677	Parker	Barbara
2631	Ortega	Anette	2678	Parker	Dixie
2632	Ortiz	Carol	2679	Parker	Judith
2633	Ortiz	Robert	2680	Parker	Lea
2634	Ortner	Jonathan	2681	Parker	Les
2635	Osawa	Keeya	2682	Parker	Mathew
2636	Osmer	William	2683	Parker	Theresa
2637	Ossana	Sara	2684	Parker	Wendy
2638	Osterday	Tom	2685	Parks	Durrie
2639	Ostlie	Susan	2686	Parks	Robert
2640	Oswald	Fred	2687	Parnell	Eve
2641	Otchy	Zarouhi	2688	Parr	Carmel
2642	Otoole	Gabriela	2689	Parrino	Adriana
2643	Otts	Parker	2690	Parsons	Don
2644	Ouenniche	Nadia	2691	Pasch	Katherin
2645	Overton	Kathleen	2692	Pasion	Humberto
2646	Oviatt	Stephen	2693	Paszkiewicz	Theresa
2647	Oviedo	Myriam	2694	Patchen	Barbara
2648	Owen	Cheryl	2695	Paterson	Alanna
2649	Owen	Debra	2696	Patterson	Janna
2650	Owens	Christina	2697	Pauk	George
2651	Ozturgut	Bristol	2698	Paul	Linda
2652	P	Allison	2699	Paul	Ron
2653	Pace-Duncanson	Bonnie	2700	Paull	David
2654	Pacheco	Maria	2701	Pauls	Chester
2655	Packer	Irene	2702	Pauls	Robert
2656	Padden	Marianne	2703	Pawloski	Linda
2657	Padelford	Grace	2704	Peacock	Cameron
2658	Page	Richard	2705	Pearcy	Elizabeth
2659	Paget	Steven	2706	Peddy	Jan
2660	Pakula	Morgan	2707	Peed	Michael
2661	Pal	M	2708	Peirce	Susan
2662	Palacky	Tami	2709	Peloquin	Kimberly
2663	Palit	Tanya	2710	Pennell	Dennis
2664	Palm	Lowell	2711	Pennington	Jennifer
2665	Palmer	Debra	2712	Penta	Brenda
2666	Palmer	Dominique	2713	Perdue	Elizabeth
2667	Palmer	Kelleigh	2714	Perez	Angelique

	Last Name	First Name		Last Name	First Name
2715	Perez	Janet	2762	Pluta	Paula
2716	Perez	Marciel	2763	Pochobradsky	Mandy
2717	Perez	Marli	2764	Pociengel	Megan
2718	Perkins	Karen	2765	Pockat	Marissa
2719	Perry	Charles	2766	Podhajsky	Dea
2720	Perry	Denielle	2767	Podmore	Amanda
2721	Perry	John	2768	Polayes	Joanne
2722	Perry	Richard	2769	Polczynski	Eric
2723	Pershke	Bruce	2770	Poley	Thomas
2724	Peter	Jonathan	2771	Pomeroy	Christopher
2725	Peters	Bruce	2772	Ponce	Raphaël
2726	Peters	Robert	2773	Ponder	James
2727	Peters	Stephanie	2774	Pongyesva	Georgiana
2728	Peterson	Kate	2775	Pope	Gerard
2729	Peterson	Lori	2776	Popowski	Christine
2730	Peterson	Maria	2777	Porcher	Janeene
2731	Peterson	Tracey	2778	Porter	Candace
2732	Petertil	Victor	2779	Porter	Kenneth
2733	Petty	Kevin	2780	Pospyhalla	Shelley
2734	Pezzati	Mark	2781	Posternak	Alysha
2735	Phalon	John	2782	Potts	Gail
2736	Phelps	Jesse	2783	Potzka	Tedric
2737	Phelps	Melanie	2784	Poupart	Mike
2738	Phillips	Mary	2785	Powers	Tammy
2739	Phillips	Paul	2786	Pradetto	Joni
2740	Phillips	Weslie	2787	Pradetto	Thomas
2741	Picchetti	Gloria	2788	Prater	Thomas
2742	Piedra	Peggy	2789	Prefontaine	Joan
2743	Piehl	Gina	2790	Prehn	Tyler
2744	Pierce	Ian	2791	Prescott	Megan
2745	Pierce	James	2792	Prestie	Alisa
2746	Pierce	Rebekah	2793	Price	Kelley
2747	Pierce	Virginia	2794	Price	Rebecca
2748	Pierre	Samira	2795	Prince	Aaron
2749	Pignatti	Marco	2796	Principe	Clara
2750	Pilcher	Doug	2797	Prior	Steven
2751	Pimentel	Karen	2798	Pritchard	Adrienne
2752	Pinkus	Walter	2799	Privitera	Nora
2753	Pinque	Meryl	2800	Procter	Rebecca
2754	Pio	C	2801	Przybysz	Slowomir
2755	Pippel	Doug	2802	Puglia	Mary
2756	Pitman	Lindsey	2803	Pultz	Daniell
2757	Pittman	Christian	2804	Punyon	Ellen
2758	Place	Taylor	2805	Purdum	Robyn
2759	Placone	Jeanne	2806	Putesoy Sr.	Matthew
2760	Placone	Richard	2807	Qalhashahi	Lea
2761	Plato	Stefanie	2808	Quale	Cindy

	Last Name	First Name		Last Name	First Name
2809	Quarry	Steve	2856	Reese	Mykel
2810	Quartaroli	Richard	2857	Reeve	Katherine
2811	Quattlebaum	Russel	2858	Reeves	Hailey
2812	Quick	Zak	2859	Regalado	Feoff
2813	Quinlisk	Wendy	2860	Regan	Barry
2814	Quinn	David	2861	Regan	Troy
2815	Quinn	Nora	2862	Rehn	Debra
2816	R	Cynthia	2863	Reichert	Charlotte
2817	R	Sierra	2864	Reichert	Robyn
2818	R	Zoe	2865	Reichow	Debbie
2819	Rabago	Karen	2866	Reid	Samantha
2820	Racine	Robert	2867	Reilly	Joseph
2821	Radarian	Forrest	2868	Reimondo	Amber
2822	Radford	Etha	2869	Reindel	Emily
2823	Radke	Keith	2870	Reno	Jeannine
2824	Radke	Marcia	2871	Resnick	Leslie
2825	Raffel	Ann	2872	Reuter	Barb
2826	Rahilly	Margie	2873	Reuter	Kurt
2827	Ramirez	Hank	2874	Revuelta	Julian
2828	Ramos-Aponti	Janien	2875	Reyes	Jennifer
2829	Ramsey	Elizabeth	2876	Reyes	Lisa
2830	Rancourt	Shannon	2877	Reyes	Nyssana
2831	Rankin	Kayla	2878	Rey-Ibarra	Adele
2832	Rankin	Lee	2879	Reynolds	Bryon
2833	Ranz	Gary	2880	Reynolds	Arthur
2834	Rasmussen	Mary	2881	Rhiner	Denise
2835	Rast	Harold	2882	Rhodes	Kirk
2836	Rathmann	Pat	2883	Ricchiuti	James
2837	Ratledge	Earl	2884	Rice	Brittney
2838	Ray	Jeremy	2885	Rice	Lisa
2839	Ray	Kaitilin	2886	Rice	Steve
2840	Reaber	Doug	2887	Rich	Brittany
2841	Recht	Kerry	2888	Rich	Thomas
2842	Rector	Crystal	2889	Richaman	Thomas
2843	Reda	Patricia	2890	Richards	Jacob
2844	Redding	Patrick	2891	Richardson	Caroline
2845	Redell	Audrey	2892	Richardson	Josh
2846	Reece	Ellen	2893	Richardson	Rebecca
2847	Reed	Diana	2894	Richman	Jana
2848	Reed	Jennifer	2895	Richmond	Ionna
2849	Reed	Lisa	2896	Richmond	Lonna
2850	Reed	Mary	2897	Rickman	Martin
2851	Reed	Robin	2898	Ricks	Linda
2852	Reed	Tamara	2899	Riddell	Catherine
2853	Reeder	Carol	2900	Riddle	Charles
2854	Reed-Inman	Dorothy	2901	Riddle	Dorothy
2855	Reeg	Robert	2902	Ridenour	Kourtney

	Last Name	First Name		Last Name	First Name
2903	Rider	Dara	2950	Rodriguez	Edward
2904	Ridge	Jim	2951	Rodriguez	Simon
2905	Ridgeway	William	2952	Rodriguez	Susan
2906	Rigas	Ashely	2953	Rodriguez	Ruthanne
2907	Riley	Kathlene	2954	Roe	Derek
2908	Riley	Kelly	2955	Roemmick	Lane
2909	Rilling	Fred	2956	Rogers	Connie
2910	Rimsza	Mary	2957	Rogers	Regina
2911	Rinegar	Margaret	2958	Rogers	Sonali
2912	Rinegar	Peggy	2959	Rognerud	Sandra
2913	Ringoot	Cyndi	2960	Rohde	Tracee
2914	Rings	Sally	2961	Rohn	Douglas
2915	Riojas	Maria	2962	Rolbin	Elayne
2916	Rios	Elisa	2963	Rolf-Jansen	Bellinda
2917	Riser	Marianna	2964	Rollins	Susan
2918	Rist	Samantha	2965	Roman	Jacqueline
2919	Ritchie	Marcelyn	2966	Romano	Michael
2920	Ritter	Philip	2967	Romero	Katrina
2921	Rivas	Andrew	2968	Romero	Soledad
2922	Rivas	Jared	2969	Romesburg	Denise
2923	Rivas	Mary	2970	Romkey	Bryan
2924	Rivas	Teresa	2971	Ronaldson	Mitchell
2925	Rivas	Will	2972	Rooke	Daniel
2926	Rivera-Diaz	Javier	2973	Rooney	Peg
2927	Ro	Jackei	2974	Root	RoseMaria
2928	Robb	Daniel	2975	Rosalen	Maria
2929	Robbins	Karee	2976	Rose	Chris
2930	Robbins	Megan	2977	Rose	Denielle
2931	Roberson	SaraBeth	2978	Rose	Gary
2932	Roberto	Giovanni	2979	Rose	Hunter
2933	Roberts	Amelia	2980	Rose	Nikki
2934	Roberts	Charles	2981	Rosen	Laurence
2935	Roberts	John	2982	Rosenberg	Ellen
2936	Roberts	Peggy	2983	Rosenberg	Ellen
2937	Roberts	Sally	2984	Rosenfield	Lisa
2938	Robinson	Denten	2985	Rosenthall	Moran
2939	Robinson	Janet	2986	Rosette	Amy
2940	Robinson	Kate	2987	Rosinski	Ed
2941	Robinson	Kay	2988	Rosinski	Edwards
2942	Robinson	Ralph	2989	Rosowicz	Judith
2943	Robinson	Richard	2990	Ross	Alice
2944	Robison	Anne	2991	Ross	Douglas
2945	Robles	Michael	2992	Ross	Elizabeth
2946	Rocco	Priscilla	2993	Ross	Joy
2947	Roche	Linda	2994	Ross	Pat
2948	Rock	Sharon	2995	Ross	Patricia
2949	Rodrigues	Pam	2996	Ross	Tamera

	Last Name	First Name		Last Name	First Name
2997	Rossetti	James	3044	Salkic	Diana
2998	Rossington	Jennifer	3045	Salter	Sarah
2999	Rosso	Brit	3046	Samons	Carol
3000	Roth	Daniela	3047	Sample	Edward
3001	Roth	Jerome	3048	Sample	Sam
3002	Rothweiler	Tom	3049	San Souci	Vicki
3003	Rowell	Ann	3050	Sanborn	Georgiann
3004	Rowland	Basil	3051	Sanborn	Paul
3005	Rowlette	Catherine	3052	Sanchez	Alex
3006	Royer	Carol	3053	Sanchez	Karla
3007	Ruben	Ellie	3054	Sanchez	Kelly
3008	Rubin	Marilyn	3055	Sanchez	Virginia
3009	Ruck	West	3056	Sanchez	Diana
3010	Rudd	Tyler	3057	Sandell	Todd
3011	Ruland	Mikaela	3058	Sanders	Peggy
3012	Rule	Renee	3059	Sandford	Ben
3013	Rullo	Tony	3060	Sanford	Robert
3014	Rummerfield	Mike	3061	Sang	Sara
3015	Rumney	Abigail	3062	Sansone	Marie
3016	Rush	John	3063	Santangelo	Roseann
3017	Rushbrook	Dereka	3064	Santillo	Rise
3018	Russell	Candace	3065	Santori	Nancy
3019	Russell	Gina	3066	Sanzari	Chelsea
3020	Russell	Rhianna	3067	Sapio	Christine
3021	Russell	Douglas	3068	Sapp	Robert
3022	Rutherford	Lisa	3069	Sawyer	Margaret
3023	Rutkowski	Robert	3070	Saxton	Hope
3024	Rutt	Gloria	3071	Scanlon	Peter
3025	Ryan	Cheri	3072	Scantlebury	E Shane
3026	Ryan	Debra	3073	Schaaf	Megan
3027	Ryan	Tim	3074	Schaefer	Steve
3028	Rydman	Nate	3075	Schaible	Emily
3029	Ryer	Ashley	3076	Schali	Rachel
3030	S. Collier	Julia	3077	Schali	Ronald
3031	Saad	Alex	3078	Schallau	Adam
3032	Saarinen	Tanara	3079	Schauer	Elizabeth
3033	Sabbara	Serena	3080	Schechter	Elizabeth
3034	Sadler	Marie	3081	Schedler	Karen
3035	Sadow	Jeffrey	3082	Scheiber	Janis
3036	Sahagun	Sean	3083	Scheneman	John
3037	Salamone	Gabriella	3084	Schepp	Angel
3038	Salazar	Joe	3085	Schepper	Angela
3039	Salazar	Kathryn	3086	Scheps	David
3040	Salazar	Lisa	3087	Schermer	Linda
3041	Salgado	Luis	3088	Schiffman	Lauren
3042	Salgado	Tracie	3089	Schliesmayer	Sally
3043	Salisbury	Megan	3090	Schlum	Dawn

	Last Name	First Name		Last Name	First Name
3091	Schmidt	Justin	3138	Senette	Brent
3092	Schmidt	Stephen	3139	Serlin	Dr. Steve
3093	Schmierer	Kyle	3140	Serrano	Karen
3094	Schmittauer	John	3141	Seus	Melanie
3095	Schmonsees	William	3142	Severson	Marc
3096	Schneebeck	Carol	3143	Sevilla	Caroline
3097	Schneider	Marilyn	3144	Seward	Alma
3098	Schoene	William	3145	Sewell	Emma
3099	Scholl	Florence	3146	Sgroi	Jacqueline
3100	Scholten	John	3147	Shafer	Carolyn
3101	Schoppe	Bruce	3148	Shaffer	Nicole
3102	Schorr	Claudia	3149	Shafroth	Jane
3103	Schrauger	Stewart	3150	Shamley	Kendra
3104	Schreck	James	3151	Shanholtzer	Patricia
3105	Schroeder	Zachary	3152	Shankel	Georgia
3106	Schroeter	Rogil	3153	Shannon	Michelle
3107	Schuck	Vicki	3154	Shapiro	Aggie
3108	Schuhrke	Nancy	3155	Shapiro	Eva / Eve
3109	Schukle	Amanda	3156	Sharp	Merion
3110	Schulte	David	3157	Shaughnessy-M	Megan
3111	Schultz	Heidi	3158	Shaw	Harvey
3112	Schultz	Penny	3159	Shaw	Judith
3113	Schulz	Laura	3160	Shaw	Lauren
3114	Schumacher	Benjamin	3161	Shaw	Patrick
3115	Schumann	Pat	3162	Shaw	Tammy
3116	Schunck	Toby	3163	Shaw	William
3117	Schutkowski	Joseph	3164	Shea	Caitlin
3118	Schuyler	Catherine	3165	Shearer	Pete
3119	Schwartz	Ivy	3166	Sheely	Patricia
3120	Schwartz	Justin	3167	Shelby	Sarah
3121	Schwartz	Peter	3168	Sheldan	Vijay
3122	Scott	Annie	3169	Sheldon	Paulene
3123	Scott	Gus	3170	Shelton	Carole
3124	Scott	Mary	3171	Shelton	Dianne
3125	Scott	Thomas	3172	Shelton	Tyler
3126	Scott	Foster	3173	Shelzam	Lauren
3127	Scroggins	Jeff	3174	Shepard	Deborah
3128	Seamon	John	3175	Shepherd	Donna
3129	Sears	Carol	3176	Shepherd	Rick
3130	Secka	Mariama	3177	Sheppard	James
3131	Sedon	Douglas	3178	Sherman	Meghann
3132	Segal	Idan	3179	Shiau	Tiffany
3133	Segura	Amanda	3180	Shields	Ed
3134	Seiler	Maryilyn	3181	Shiffrin	Joyce
3135	Seltzer	Rob	3182	Shimer	Sue
3136	Seltzer	Cherie	3183	Shipley	Vickie
3137	Semerad	Gretchen	3184	Shoemaker	Sloan

	Last Name	First Name		Last Name	First Name
3185	Shook	Bruicie	3232	Smith	Deanna
3186	Shook	Philip	3233	Smith	Douglas
3187	Shoop	Karen	3234	Smith	Elaine
3188	Shores	Kathy	3235	Smith	Ellen
3189	Shores	Michael	3236	Smith	Evan
3190	Short	Kimberly	3237	Smith	Jeffrey
3191	Shoup	Susan	3238	Smith	Jennifer
3192	Shrader	Gregory	3239	Smith	Joe
3193	Shrivastava	Muskan	3240	Smith	Judith
3194	Shuey	Christopher	3241	Smith	Julie
3195	Shuker	Steven	3242	Smith	Kelli
3196	Sicz	Janice	3243	Smith	Kimberly
3197	Siebens	Heidi	3244	Smith	Latimer
3198	Sifuentes	D.G.	3245	Smith	Lauren
3199	Sigler	Ronald	3246	Smith	Linda
3200	Siladke	Mary	3247	Smith	Michael
3201	Sills-Trausch	Alec	3248	Smith	Oliver
3202	Silodor	Steven	3249	Smith	Raymond
3203	Silverman	Susan	3250	Smith	Russell
3204	Silverthorn	Amy	3251	Smith	Samantha
3205	Simeth	Jane	3252	Smith	Stephanie
3206	Simone	Beverly	3253	Smith	Wade
3207	Simone	David	3254	Smith-Baran.	Marlene
3208	Simonson	Richard	3255	Smith-Dowling	Calla
3209	Sinclair	L.	3256	Smyrl	MJ
3210	Singer	Christopher	3257	Snedeker	Stephanie
3211	Singh	Amaninder	3258	Snelson	Jason
3212	Sippl	Greg	3259	Snow	Heather
3213	Sivak	Stephanie	3260	Snyder	Nancy
3214	Skarlot	Lesa	3261	Snyder	Sara
3215	Skelton	Julia	3262	Snyder	Theodore
3216	Skiles	Dr. D	3263	Snyder	Todd
3217	Skiles	Duward	3264	Snyder Walker	Robin
3218	Slaback	Thomas	3265	Sobkowiak	Michael
3219	Slade	Annette	3266	Soda	Michael
3220	Slason	Armand	3267	Soine	John
3221	Sloan	Amy	3268	Sojourner	Mary
3222	Smeaton	James	3269	Soland	Margaret
3223	Smith	Allison	3270	Solangi	Tash
3224	Smith	Anita	3271	Solanky	Anil
3225	Smith	Anthony	3272	Solari	Giuliana
3226	Smith	April	3273	Solin	Alana
3227	Smith	Barbara	3274	Soll	Hugo
3228	Smith	Bob	3275	Soltis	William
3229	Smith	Chase	3276	Somoz	Kathryn
3230	Smith	Connor	3277	Song	Claire
3231	Smith	Daniel	3278	Song	Wansun

	Last Name	First Name		Last Name	First Name
3279	Sorenson	Scott	3326	Steffy	Stephen
3280	Sorrell	JoAnn	3327	Steiger	Margaret
3281	Sorrentino	Lucius	3328	Steigerwald	Claire
3282	Sortland	Deana Z	3329	Stein	M.
3283	Sotere	Valerie	3330	Stein	Margaret
3284	Soto	Jesus	3331	Steinberg	David
3285	Sowell	Jenny	3332	Steiner	Neal
3286	Sparks	Kate	3333	Steiniger	Bob
3287	Sparks	Rick	3334	Steininger	Lorenz
3288	Sparrow	Deb	3335	Steinmetz	Josh
3289	Spaulding	Kate	3336	Stellar	Joni
3290	Species	Scott	3337	Stengel	Tom
3291	Spence	David	3338	Stent	Mike
3292	Spence	Skylar	3339	Stephens	Laura
3293	Sperl	Tpd	3340	Stephens	Michelle
3294	Spillman	Dave	3341	Stephens	Sherman
3295	Spillman	Katherine	3342	Stephens	Steve-Anna
3296	Spilman	Charles	3343	Stepnicka	Sara
3297	Spilsbury	Delaine	3344	Sterkel	Mark
3298	Spoerl	Tod	3345	Stern	Neshama
3299	Sporborg	Nancy	3346	Steuter	Don
3300	Sporn	Douglas	3347	Stevens	Grant
3301	Spotts	Richard	3348	Stevens	Susie
3302	Spragett	Cedra	3349	Stevenson	Barry
3303	Sprecher	Cindy	3350	Stewart	Bob
3304	Sprecher	Robert	3351	Stewart	Jenifer
3305	Spryshak	Jackie	3352	Stewart	John
3306	Spurr	Karen	3353	Stewart	Loyette
3307	Squires	Andrea	3354	Stewart	Nancy
3308	Stabile	Michael	3355	Stewart	Robert
3309	Stahl	Emily	3356	Stickles	Brian
3310	Stahl	Victoria	3357	Stidley	Chris
3311	Stambaugh	Alice	3358	Stineman	Thomas
3312	Stander	Tom	3359	Stites	Henry
3313	Stangl	Katherine	3360	Stitt	Kirk
3314	Stankowitz	Ryan	3361	Stob	Nicole
3315	Stanley	Willaim	3362	Stock	Sandra
3316	Stannard	Mark	3363	Stockslager	Jack
3317	Stansill	Sarah	3364	Stockton	Bret
3318	Stanton	Jeff	3365	Stockton	Heather
3319	Stark	Louise	3366	Stoffers	Joyce
3320	Staron	Maryann	3367	Stone	Alyssa
3321	Statland	Joyce	3368	Stone	Judy
3322	Staton	Carrie	3369	Stone-Meyer	Virginia
3323	Stebbings	Barrie	3370	Stoner	Kristine
3324	Stedman	Holly	3371	Storer	Tim
3325	Steele	Donna	3372	Storer	Time

	Last Name	First Name		Last Name	First Name
3373	Storm	Stinne	3420	Sy	Steven
3374	Stortz	Libby	3421	Sylver	Nenah
3375	Stover	Andrew	3422	Syme	Jim
3376	Stover	Charry	3423	Symington	Michele
3377	Stransky	Diana	3424	Syz	Mr.
3378	Stratton	Torrence	3425	Szuzwalak	Joe
3379	Straub	Marcus	3426	Szwedko	Jill
3380	Straus	Anna	3427	Szyposzynski	Halina
3381	Street	Kerga	3428	T	Francesco
3382	Street	Kergan	3429	Tabor	Douglas
3383	Streit	Jon	3430	Tackett	Cassidy
3384	Stringer	Ben	3431	Tait	Barbara
3385	Strogen	Jim	3432	Talbot-Heindl	Chris
3386	Strohacker	Eric	3433	Tamarack	Michael
3387	Struble	Dan	3434	Tamayo	Harrison
3388	Strupeck	Anthony	3435	Taney	Wilhelmina
3389	Stuart	Hayley	3436	Tanis	James
3390	Stuhaan	Sandy	3437	Tankersley	Jason
3391	Stukan	Nancy	3438	Tanner	Carran
3392	Stuller	Craig	3439	Tanner	Jeffrey
3393	Stumpf	Lawrence	3440	Tarallo	Mary
3394	Stumpff	Linda Moon	3441	Tashima	Fred
3395	Sturart	Chelsey	3442	Tax	Wilhelmina
3396	Stutzman	Kerry	3443	Taylor	Ellen
3397	Sullivan	Alexandra	3444	Taylor	Gigi
3398	Sullivan	Daryl	3445	Taylor	Janice
3399	Sumler	James	3446	Taylor	Josh
3400	Summers	Harry	3447	Taylor	Lilia
3401	Summers	Jessica	3448	Taylor	Mathew
3402	Summerville	Logan	3449	Taylor	Tom
3403	Sundari	Julia	3450	Teal	Louise
3404	Susan	Meyer	3451	Tedesco	Terry
3405	Susong	Aram	3452	Tegner	Ingrid
3406	Suster	Kristina	3453	Tennyson	Estella
3407	Sutherland	Lawrence	3454	Terry	Rita
3408	Sutton	Russ	3455	Teunissen	Christina
3409	Swadley	Virgil	3456	Thalmann	Lori
3410	Swanson	Sue	3457	Thelen	Elizabeth
3411	Swarts	Carol	3458	Theurer	Laura
3412	Swartz	Martha	3459	Thiedmann	Andreas
3413	Sweeney	Dan	3460	Thiessen	Derinda
3414	Sweeney	Hikaru	3461	Thigpen	Alice
3415	Sweeney	Paul	3462	Thing	Susan
3416	Sweet	Timothy	3463	Thomas	Kati
3417	Swift	James	3464	Thomas	Marcia
3418	Swift	Marguerite	3465	Thomas	Melody
3419	Swope	Forrest	3466	Thomas	Natahly

	Last Name	First Name		Last Name	First Name
3467	Thomas	Paul	3514	Tripp	Barbara
3468	Thomas	Stephen	3515	Tripp	Tom
3469	Thomas	Timothy	3516	Troche	Laura
3470	Thomas-Kruse	Connie	3517	Trollinger	Mark
3471	Thompson	Brian	3518	Tropp	Rosanna
3472	Thompson	Dana	3519	Trotter	Russell
3473	Thompson	Ginger	3520	Truckner	Amy
3474	Thompson	Linda	3521	Trudeau	Lindsay
3475	Thompson	Mary	3522	Truex	Gina
3476	Thompson	Michael	3523	Tryon	Andrew
3477	Thompson	Mrs.	3524	Tsosie	Erik
3478	Thompson	Natasha	3525	Tuber	Jack
3479	Thompson	Nathan	3526	Tuck	Judith
3480	Thompson	RC	3527	Tucker	Karen
3481	Thompson	Robert	3528	Tufenkjian	Stephanie
3482	Thompson-Brooks	Zoe	3529	Turhall	Laura
3483	Thornton	William	3530	Turiano	Thomas
3484	Thorpe	Samuel	3531	Turley	Gail
3485	Thorson	Kevin	3532	Turner	Gina
3486	Thune	Robert	3533	Turner	Phyllis
3487	Tilousi	Carletta	3534	Turner	Virginia
3488	Tilton-Jones	Carrie	3535	Turobiner	Martha
3489	Tineo	Francisco	3536	Tuttle	Catherine
3490	Tippett	Alec	3537	Tuttle	Robert
3491	Tirion	Kate	3538	Tuttle	Stuart
3492	Tiritilli	Debra	3539	Tuttle	Grace
3493	Tissenbaum	Mady	3540	Tyler	Jill
3494	Todd	Joan	3541	Tyler	Steve
3495	Tomb	Joanne	3542	Uchino	Crystal
3496	Tomer	Lavina	3543	Ufford	Richard
3497	Tomkins	Marissa	3544	Ulaszek	John
3498	Toner	Jean	3545	Ullian	Barbara
3499	Tooze	Jayme	3546	Ulreich-Power	Siobhan
3500	Torget	Marie	3547	Umphries	Andrew
3501	Torre	Sue	3548	Unger	Felix
3502	Torrence	Ian	3549	Unknown	Dianne
3503	Torres	Brady	3550	Upczak	Emilie
3504	Tracey	Sybil	3551	Uppgaard	Heidi
3505	Tran	Nanette	3552	U'Ren	Stephen
3506	Tran	Sheila	3553	Utter	Sammy
3507	Traveller	Evelyn	3554	Vaccaro	Rachel
3508	Treanor-Brown	Kyle	3555	Vail	Clarinda
3509	Trecartin	Constance	3556	Vail	Mark
3510	Treschel	Ann Louise	3557	Valle	Nayda
3511	Trevethan	Giselle	3558	van de Waarsen	Mars
3512	Triassi	Susan	3559	Van Fleet	Michelle
3513	Trieshmann	Scott	3560	Van Laere	Patrick

	Last Name	First Name		Last Name	First Name
3561	Van Osten	Kathleen	3608	Vogler	Michael
3562	Van Winkle	Steve	3609	Vogt	Shelly
3563	Van Zee	Ali	3610	Voigt	Jamie
3564	Vana	Cheryl	3611	Voise	Eric
3565	Vance	Patricia	3612	Vollmer	Alexander
3566	Vance	Philo	3613	Vollmer	Terry
3567	VanDenzen	Elizabeth	3614	Volz	Candace
3568	Vanderbilt	Philip	3615	Vorreiter	Clare
3569	VanHorsen	David	3616	Voskoboynik	Richard
3570	Vansteenkiste	Brian	3617	Vosti	Jessie
3571	Vanwells	Alixe	3618	Vouroscallahan	Pamela
3572	Varela	Marco	3619	Voves	Deborah
3573	Varga	Dolores	3620	VrMeer	Janice
3574	Vargo	Gary	3621	W.	Christin
3575	Varvoutis	Anthony	3622	Wade	Aaron
3576	Vasquez	Christian	3623	Wade	Elizabeth
3577	Vasquez	Jeronimo	3624	Wager	Joan
3578	Vassar	Kristen	3625	Wagner	Andie
3579	Vaughan	Stephen	3626	Wagner	Molly
3580	Vaughn	Meghan	3627	Wagner	Sara
3581	Vaughn	Patrick	3628	Wakayuta	Sonwai
3582	Verellen	Margaret	3629	Wakefiel	Jason
3583	Verplank	Lana	3630	Wakerfield	Marie
3584	Vesowate	Anne	3631	Walas	Dana
3585	Vessels	Alex	3632	Waldmann	Stephen
3586	Vicenti	Arielle	3633	Wale	Liisa
3587	Vickers	James	3634	Walker	David
3588	Vicuna	Steve	3635	Walker	Heather
3589	Villaman	Sylvia	3636	Walker	James
3590	Villarreal	Carlos	3637	Walker	Kathalin
3591	Villeco	Elena	3638	Walker	Luke
3592	Villegas	Cynthia	3639	Wall	Joy
3593	Villegas	Joanna	3640	Wallace	Michael
3594	Villodas	Abigail	3641	Waller	Arelene
3595	Vincent	Joshua	3642	Walsh	Dennis
3596	Vincent	Peggie	3643	Walsh	Justin
3597	Vincent	Peggie Jo	3644	Walt	Barbara
3598	Vincinet	Joshua	3645	Waltasti	Marilyn
3599	Vines	David	3646	Walters	Ernie
3600	Viramontes	Christine	3647	Walters	Riveraine
3601	Virzi	Nichelle	3648	Walton	Shannon
3602	Visconti	Angela	3649	Wampler	Shyann
3603	Vo	Stephanie	3650	Wang	Alice
3604	Voeller	Estelle	3651	Wang	Angela
3605	Vogel	Sally	3652	Ward	Nancy
3606	Vogele	Arlene	3653	Ward	Richard
3607	Vogle-McNew	Ashleigh	3654	Ward	Sarah

	Last Name	First Name		Last Name	First Name
3655	Ward	Sophie	3702	Welbourn	Tyler
3656	Ward	Whitney	3703	Welch	Elizabeth
3657	Wardzinski	Rachel	3704	Welch	Randall
3658	Warner	Dakota	3705	Wellborn	Michael
3659	Warner	Paula	3706	Welles	Di
3660	Warner	Pilar	3707	Wellington	Mary
3661	Warnke	Cheryl	3708	Wells	Janette
3662	Warnock	Karen	3709	Welsh	Laurie
3663	Warren	Barbara	3710	Welty	Thomas
3664	Warren	Craig	3711	Wendel	Anne
3665	Warren	Megan	3712	Wendelken	Natalie
3666	Warren	Sara	3713	Weng	Michael
3667	Warwick	ES	3714	Wenger	David
3668	Warwick	Shannon	3715	Wernette	Tim
3669	Waser	Shlomo	3716	Wesley	Susan
3670	Washington	Chris	3717	Wessner	Michael
3671	Wasson	Cynthia	3718	West	David
3672	Watahomigie	Damon	3719	West	Samuel
3673	Watchempino	Laura	3720	Westbrook	Janet
3674	Watchepino	L.	3721	Westfall	Stephen
3675	Waters	Anje'	3722	Wetzel	Glen
3676	Waters	Deborah	3723	Whale	Rich
3677	Waters	Jennifer	3724	Whaley	Michael
3678	Watkins	Jack	3725	Wheeler	Barbara
3679	Watson	Harold	3726	Wheeler	Dorothy
3680	Watson	Kathy	3727	Wheeler	Mariko
3681	Watt	Linda	3728	Wheeler	Mark
3682	Wattler	James	3729	Wheeler	Tim
3683	Watts	Elizabeth	3730	Whitaker	Kathleen
3684	Waugh	Wanda	3731	White	Clare
3685	Wauschek	Michael	3732	White	Geneva
3686	Weaver	Craig	3733	White	Logan
3687	Webb	Arthur	3734	White	Mariah
3688	Webb	Brad	3735	White	Mary
3689	Webb	Sandra	3736	White	Nancy
3690	Weber	Bethany	3737	White	Nicholas
3691	Weber	Kenneth	3738	White	Rachel
3692	Weber	Stuart	3739	White	Riely
3693	Webster	Catherine	3740	White	Roberta
3694	Webster	Judith	3741	Whitehouse	Judy
3695	Webster	Phyllis	3742	Whitley	Sandy
3696	Weigel	Kate	3743	Whitman	Regina
3697	Weil	George	3744	Whitme	Betty
3698	Weis	Erica	3745	Whitney	Robert
3699	Weissmueller	Bonnie	3746	Whittle	Laurie
3700	Welborn	Michael & Valerie	3747	Wholf	Richard
3701	Welborn	Thomas	3748	Wickham	Ken

	Last Name	First Name		Last Name	First Name
3749	Widener	Markus	3796	Wilson	Sarah
3750	Wieder	Anna	3797	Wilson	Sidonie
3751	Wiegand	Jenny	3798	Wilson	Sodonie
3752	Wiemer	Wolfgang	3799	Wilson	Will
3753	Wiener	Wendy	3800	Wilwol	Frank
3754	Wiggins	Michael	3801	Winslow	Lee
3755	Wikinson	Diana	3802	Winter	Lindsay
3756	Wilde	Deena	3803	Winters	Christopher
3757	Wilde	Jacqueline	3804	Wisgirda	Mary
3758	Wilder	Megan	3805	Wist	Rover & Ila
3759	Wiley	Carol	3806	Withem	Ryan
3760	Wilhelm	Dave	3807	Wittenberg	Cindy
3761	Wilhelm	Lisa	3808	Wittenberger	Sara
3762	Wilkening	Betsy	3809	Witzeman	Janet
3763	Wilkin	Sue	3810	Witzerman	Janet
3764	Wilkinson	Diana	3811	Wojtazek	Alyssa
3765	Wilkinson	Marion	3812	Wolf	Barry
3766	Willard	Bonnie	3813	Wolf	Rachel
3767	William	Harris	3814	Wolf	Tim
3768	Williams	Alison	3815	Wolfe	Jonathan
3769	Williams	Ann	3816	Wolff	Jennifer
3770	Williams	Catherine	3817	Wolff	Pat / Patt
3771	Williams	Cathy	3818	Wollman	Nan
3772	Williams	Deborah	3819	Wolter	Mary
3773	Williams	Diana	3820	Wolter	Mary & Jack
3774	Williams	Donna	3821	Wolverton	W
3775	Williams	Edwin	3822	Womac	Carl
3776	Williams	Gail	3823	Womack	Carl
3777	Williams	Gayne	3824	Wong	Marnie
3778	Williams	Heather	3825	Wood	Barbara
3779	Williams	Janet	3826	Wood	Margaret
3780	Williams	Melissa	3827	Wood	Nancee
3781	Williams	Stefan	3828	Woodin	Steve
3782	Williams	Sue	3829	Woodley	Jack
3783	Williams	Tara	3830	Woods	April
3784	Williams	Terrie	3831	Woods	Dana
3785	Williams	Wendy	3832	Woods	Jeanne
3786	Willie	Diana	3833	Woodward	Kelsey
3787	Willoughby	Judith	3834	Woolever	Phillip
3788	Wills	Debra	3835	Wootton	Sharon
3789	Wilson	Alora	3836	Workinger	Sarah
3790	Wilson	Chris	3837	Workman	Billy
3791	Wilson	Ivalee	3838	Worthy	Crista
3792	Wilson	Judith	3839	Wright	Debra
3793	Wilson	Kendrick	3840	Wright	Joan
3794	Wilson	Marty	3841	Wright	Michael
3795	Wilson	Michael	3842	Wright	Sally

	Last Name	First Name
3843	Wruck	Dave
3844	Wuenker	Bruce
3845	Wukitsch	Kimber
3846	Wukitsch	Kimberley
3847	Wulbern	Kristina
3848	Wyberg	Bryan
3849	Wymnberry	Rachel
3850	Wynne	Judson
3851	Yackley	Mark
3852	Yaffe	Laurence
3853	Yamauchi	Saeko
3854	Yarnell	Susan
3855	Yates	Robyn
3856	Yazzie	Cyle
3857	Yeager	Donald
3858	Yeargain	Peggy
3859	Yee	Dennis
3860	Yellowhair	Veronica
3861	Yelton	Ron
3862	Yerden	Carol
3863	Yerman	Leslie
3864	Yeung	Selina
3865	Yomboro	Zach
3866	Yon	Sharon
3867	Yost	Carol
3868	Young	Aria
3869	Young	Carolyn
3870	Young	Kelly
3871	Young	Landon
3872	Young	Michael
3873	Young	Miranda Allison
3874	Young	Neal
3875	Young	Danel
3876	Younstrom	Beverly
3877	Yowell	Kathryn
3878	Yu	Bonnie
3879	Zabek	Abe
3880	Zabilski	Julie
3881	Zabonik	Kerry
3882	Zachary	Nick
3883	Zacsk	Kim
3884	Zagula	Loraine
3885	Zak	Emma
3886	Zamoch	Joe
3887	Zampieri	Janet
3888	Zamudio	Oscar
3889	Zanipatin	Angelica
3890	Zappa	Andrea
3891	Zarnoch	Joe
3892	Zastrow	Lauren
3893	Zato	Lisa
3894	Zelasko	Sandy
3895	Zelechowski	Jamie
3896	Zelman	Mark
3897	Zibler	Claire
3898	Zierler	Joan
3899	Zilber	Claire
3900	Zimmer	Dr.
3901	Zimmerman	Ashleigh
3902	Zimmerman	Richard
3903	Zink	Bryan
3904	Zinkann	Elizabeth
3905	Zinter	Yvonne
3906	Zucker	Izabella
3907	Zucker	Randy
3908	Zupan	Franc
3909	Zurcher	Naomi
3910	Zwemer	Jack