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ISSUES TO GENERATE QUESTIONS

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[redacted]

Response 12

The TCEQ enforces the permit, PAA, and rule requirements and can initiate an enforcement action which may result in the issuance of an enforcement order. An enforcement order requires payment of a fine, and if appropriate, sets out corrective actions the permittee must take to come into compliance. The TCEQ may seek administrative penalties of up to $10,000 a day for each violation and civil penalties of up to $25,000 a day for each violation.[13] If the permittee fails to remit the fine imposed, the case is referred to the Texas Office of the Attorney General for collection. Failure to comply with an ordering provision for corrective action is an independent violation and can result in additional enforcement actions at the TCEQ. Also, the TCEQ can refer a case to the Office of the Attorney General, who may pursue an injunction to require the permittee to perform the corrective actions in the TCEQ enforcement order.

The amount of the fine imposed in an enforcement case is determined by using the TCEQ Penalty Policy in force at the time the violation is screened by the enforcement division. The current Penalty Policy is available to the public on TCEQ's website at http://www.tceq.state.tx.us/comm_exec/forms_pubs/pubs/rg/rg-253/.

In addition to administrative penalties, a person may also be subject to criminal liability for knowingly or intentionally violating a requirement of the Injection Well Act, a requirement of TCEQ rule, or a TCEQ permit or PAA.[14]

Comment 13

David and Carol Warren ask what protection surrounding landowners have and how citizens can be assured the mining company will honor the applicable laws. Ted Long asked what provisions are in place to require UEC to adequately compensate parties adversely affected by damages from mining.

Response 13

The fact that a person has an injection well permit or PAA does not relieve the person of any civil liability. The issuance of the permit does not authorize any injury to persons or property or an invasion of property rights, or any infringement of state or local law or regulations. Individuals may protect their rights by contacting local law enforcement or seeking redress in a civil legal proceeding. Individuals are encouraged to report any concerns or suspected noncompliance with the terms of any permit or environmental regulation to the TCEQ by contacting the Corpus Christi Regional Office at 361-825-3100, or by calling the 24-hour toll-free Environmental Complaints Hotline at 1-888-777-3186. The TCEQ investigates all complaints received in a timely manner. If the facility is found to be out of compliance with the terms and conditions of its permit, it will be subject to enforcement action.

Comment 14

GCGCD commented that a minimum of 1% bleed is required during *in situ* mining.

[13] Tex. Water Code §§ 7.052, 7.102.

[14] Tex. Water Code § 7.157.

Response 14

A permittee is required to confine mining solutions to the production zone within the area of designated production zone monitor wells under 30 TAC §331.102. Maintaining a bleed is one method for ensuring confinement of mining solutions. [15] The Executive Director is not aware of any Texas statute or regulation that includes a requirement to maintain a minimum bleed of 1% during *in situ* mining operations. The Executive Director notes that a bleed of 1% is typical for *in situ* uranium mining operations in South Texas.[16]

D. DATA CONCERNS

Comment 15

CBGSC provided several comments regarding the determination of baseline water quality:

1. CBGSC asked why there is a dramatic difference in values for uranium and radium-226 between the September 2008 proposed restoration table and the March 2009 table. Specifically, CBGSC asked why the analytical results from baseline wells PTW-7 through PTW-14 differ so strikingly when compared to those from baseline wells PTW-1 through PTW-6.
2. CBGSC noted that results from analysis of groundwater samples from the original ten baseline wells had an average uranium value of 33 micrograms per liter, but the average for the additional eight baseline wells was 218 micrograms per liter.
3. CBGSC commented that correcting the error in the baseline data resulted in the average value for uranium changing from 151 micrograms per liter to 115 micrograms per liter.
4. CBGSC emphasized that the lowest uranium value from the eight additional baseline wells (PTW-7 through PTW-14) was 86 micrograms per liter, which is greater than the maximum value of 80 micrograms per liter from the initial ten baseline wells.

Similar concerns were expressed by GCGCD, which questioned the validity and consistency of this data. Cyrus Reed of the Lone Star Chapter of the Sierra Club commented that there are differences in the concentrations of uranium found in the initial baseline well groundwater samples and those from subsequent samples. GCGCD also commented that to allow restoration to those high levels of contamination will leave a large volume of contaminated water in Sand B that will migrate downdip, potentially threatening the health of many current and future residents. GCGCD questioned whether the TCEQ will allow this potential to exist. In reference to its concerns regarding the data from the baseline wells, GCGCD questioned whether or not the data from the 18 baseline wells accurately represents the water quality prior to exploration. Mr. and Mrs.

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[15] The term "bleed" refers to the rate at which fluid is withdrawn during *in situ* mining operations minus the rate at which fluid is injected during these operations. More fluid is withdrawn than is injected during mining operations in order to direct the injected fluids toward the recovery wells, thereby restricting the injected fluid to the production zone within the production area.

[16] Kohler, D. P., 1984, *Underground Injection Operations in Texas*, Tex. Dept. Water Res., Report 291, page 4-8.

Manfred Scheurich expressed the concern that there was a lack of use of sound scientific methods to accurately assess pre-mining groundwater quality.

Response 15

UEC originally submitted baseline information in 2008 for baseline wells PTW-1 through PTW-6. In 2009, UEC submitted additional baseline information for PTW-7 through PTW-14 in order to meet the new baseline well requirement of the revised TCEQ rule in 30 TAC §331.104(c). The concentrations of uranium and radium-226 in groundwater samples vary through the production zone within the production area, both horizontally and vertically, and based on proximity to uranium mineralization. Uranium and radium-226 values from groundwater samples taken from the baseline wells appear to be a function, at least in part, of screen length, screen placement, and vertical distribution of uranium mineralization. Ten of the baseline wells had respective screen lengths of 19.4 to 24.79 feet, two had respective screen lengths of 14.43 to 15 feet, three had respective screen lengths of ten feet, and two had respective screen lengths of five feet (see following table). The highest uranium and radium-226 values were in wells with screen lengths of 20 feet (PTW-7) and 14.43 feet (RBLB-5).

Well #	Screen Length (ft)	Screen Placement*	U (mg/l)	Ra-226 (pCi/l)
PTW-1	20	Above ore	0.032	17.0
PTW-2	20	In ore	0.009	17.0
PTW-3	20	Partially in ore	0.009	38.0
PTW-4	20	Partially in ore	0.059	196.0
PTW-5	20	Below ore	0.005	357.0
PTW-6	20	In ore	0.010	202.0
PTW-7	20	In ore	0.804	1684.0
PTW-8	10	In ore	0.134	397.0
PTW-9	5	In ore	0.135	394.0
PTW-10	10	In ore	0.099	68.0
PTW-11	10	In ore	0.166	296
PTW-12	5	In ore	0.163	477.0
PTW-13	20	In ore	0.156	10.0
PTW-14	15	In ore	0.086	224.0
RBLB-1	24.79	In ore	0.062	393.0
RBLB-3	19.40	Above, partially in Overlying confining zone	0.080	110.0
RBLB-4	19.44	In ore	0.006	37.2
RBLB-5	14.43	In ore	0.060	1090

UEC has proposed restoration values based on the arithmetic mean, which was calculated using the data from these 18 baseline wells. This method is allowed under 30 TAC §331.107(a)(1)(A). The Executive Director regards the data to be valid and has no information or evidence to suggest that the data is inaccurate. During mining operations, UEC is required to confine mining solutions to the production zone within the production

area,[17] which would be accomplished in part by maintaining a bleed.[18] UEC also is required to install and operate monitor wells, both in the production zone and in overlying Sand A, for detection of any excursions of mining fluids, and to address any excursions in accordance with the requirements at 30 TAC §331.106 (Relating to Remedial Action for Excursion Control). Once mining is complete, UEC is required to restore the groundwater in the mined portion of Sand B in accordance with the requirements at 30 TAC §331.107 (Relating to Restoration). For these reasons, the Executive Director does not agree that a large volume of contaminated water in Sand B will migrate downdip and pose a potential threat to human health and the environment.

Comment 16

CBGSC asked if something occurred during the time between drilling and testing of the first set of ten baseline wells and that of the additional eight baseline wells.

Response 16

The Executive Director is not aware of the occurrence of any event between drilling and testing of the RBLB (Regional Baseline Sand B) wells, PTW-1 through PTW-6, and PTW-7 through PTW-14 that would influence the levels of constituents in groundwater samples from these wells.

Comment 17

Josh Leftwich with UEC commented that the typographical error discovered in the application has been corrected. The error was on Table 5.2 (Production Zone (Sand B) Water Quality). As explained by Mr. Leftwich, a spreadsheet was used to compute the high, low, and average value for each of the 26 constituents listed in this table. The values for well PTW-7 inadvertently were included twice, resulting in high average values for uranium and radium-226 on the proposed restoration table in the final draft PAA.

Response 17

The Executive Director has received a revision to the application to correct this error, and this revision has been placed in the application. The draft PAA has been revised.

Comment 18

GCGCD commented that the UEC application contained no discussion of how wells were developed, nor did UEC provide records of the amount of water removed from each well during development. GCGCD emphasized that the installation of a groundwater well is considered to be a major source of contamination introduced into an undisturbed aquifer. GCGCD further stated that in the case of a well drilled into a uranium ore body, the introduction of oxygen during the drilling and development of the well will initiate the process of slowly dissolving the ore, which may result in the elevated concentrations of constituents such as uranium, arsenic, selenium, molybdenum and sulfur in samples collected from the well. Lastly, GCGCD stated that proper well development is needed to remove sediment and contamination prior to collecting samples.

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[17] 30 TAC §331.102.

[18] UEC Class III UIC application, pp. 9-14.

Response 18

Well development is the process of cleaning out and removing materials (such as drilling mud and cement) that were introduced into the well during the drilling and installation of the casing and well screen so that the well can be put into service. The Executive Director notes that although UEC's application for a Class III injection well area permit contains a detailed description of the proposed well design and construction methods, neither it nor the PAA application contain a discussion of how wells are developed. According to discussions with UEC representatives, all wells are developed in the following manner:

1. Once a well is completed, an air line is lowered into the casing, and the well screen is jetted with air to remove any scale or mud from the screen;
2. The well is then pumped until the produced water is clean; generally this takes about 2 hours; the amount of water pumped is recorded.
3. The well is allowed to rest for approximately two weeks; then groundwater is sampled for pH as a quality check; pH of Goliad Formation water consistently is in the range of 7-8.

While there are no specific rule requirements with respect to well development, the Executive Director finds these procedures to be acceptable, and does not agree that the introduction of air at the well screen will initiate dissolution of the ore, resulting in elevated concentrations of constituents such as uranium, arsenic, selenium, molybdenum and sulfur in the groundwater. As described in UEC's Class III injection well area permit application,[19] oxygen is required for the dissolution of uranium. To accomplish this, pure oxygen, not air (which contains about 21% oxygen) is continuously added to the mining fluid. Also, a complexing agent, such as bicarbonate, is added to aid in keeping the uranium in solution. For these reasons, the Executive Director finds insufficient evidence to conclude that air, introduced for a limited amount of time at the well screens, will result in the initiation of the *in situ* process, and, that once initiated, the process will self-perpetuate.

Comment 19

GCGCD commented that the turbidity of a groundwater sample should be below five nephelometric turbidity units (NTUs),[20] and that a sample whose turbidity is above five NTUs has a considerable amount of suspended particles. GCGCD noted that the laboratory reports in Appendix A of UEC's application indicate that for samples from three of the nine OMW (overlying monitor well) wells, eleven of the 22 BMW (sand B monitor well) wells, and five of the six PTW (pump test well) wells, the NTU value for each exceeded five NTUs. GCGCD also noted that many of the elevated uranium concentrations are associated with wells that have high NTU values, which may indicate radium is one of the suspended particles in the samples. GCGCD emphasized this conclusion is logical as radium ions are known to adsorb onto clay particles. GCGCD stated that the elevated NTU values indicate suspended particles in the sample and suggests that well development was incomplete prior to sampling.

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[19] UEC Class III UIC area permit application, Section 9.0.

[20] One NTU is defined as 1 milligram of finely divided silica in a liter of water.

Response 19

According to notes on the laboratory reports in Appendix A of UEC's PAA1 application, samples with high turbidity also contained hydrogen sulfide gas,[21] which affects the clarity of the groundwater samples. Therefore, the level of turbidity most likely is due to the hydrogen sulfide gas dissolved in the groundwater, not suspended particles. Also, the Executive Director notes that all samples are filtered prior to analysis, which will remove suspended particles. With regard to adsorption of ions onto clay particles, the Executive Director would anticipate that this process would affect other ions as well, especially the more abundant ones such as sodium, chloride, calcium, and magnesium. Based on the groundwater sample analyses, there is no obvious correlation between the concentration of these constituents and the turbidity of the sample.

Comment 20

GCGCD commented that when the sample collection dates provided on the laboratory reports in Appendix A of UEC's application are compared with the well completion dates in Appendix C, there appears to be two to four weeks between well completion and sampling for the PTW wells, five to nine weeks for the BMW wells, and four to five weeks for the OMW wells. GCGCD asked what the basis is for the different periods between well groups. GCGCD stated their concern is that a shorter development time for the PTW wells could indicate the aquifer was still in a disturbed state when the samples were collected, which it says is suggested by the elevated NTU measurements. GCGCD stated that this is significant because the PTW well samples are from the ore-bearing zone, and disturbance of this zone suspends micron-sized particles from the ore body into the groundwater, and these particles could result in anomalously high measurements of uranium and radium in the groundwater. GCGCD recommended a minimum of four samples from each well, with a minimum of two weeks between sampling events, to ensure representative samples were collected during the initial sampling event.

Response 20

The Executive Director does not find any significance in the amount of time between well completion and sampling. As discussed in Response 18, once developed, all wells are allowed to stand for at least two weeks, and then are sampled for pH as a quality check. Also as discussed in Response 18, prior to analysis, all samples are filtered to remove any suspended particles. With regards to the recommendation of a minimum of four samples per well, the Executive Director notes that baseline was not determined on an individual well basis, but on the basis of the entire area of the PAA. Baseline determination was based on sample results from 18 wells, which meets the requirements of 30 TAC §331.104 (Relating to Establishment of Baseline and Control Parameters for Excursion Detection).

[21] The presence of H_2S indicates reducing conditions.

Comment 21
GCGCD commented that the Nuclear Regulatory Commission (NRC)[22] and the United States Environmental Protection Agency (EPA)[23] each have stated that acceptable sampling procedures must be used for sample collection, and asked what procedures were followed to measure field parameters, collect the samples, and ensure container integrity between collection and analysis.

Response 21
On the Production Area Authorization Form,[24] TCEQ Technical Guideline I-*Groundwater Analysis*, is referenced. This document provides guidance regarding the collection and analysis of groundwater samples. UEC describes use of Technical Guideline I *Groundwater Analysis* and *EPA's Methods for Chemical Analysis of Water and Wastes* in Section 4.1, *Methods*, of the application for the Class III injection well area permit.

Comment 22
GCGCD commented that no completion reports for the OMW and BMW wells were included in Appendix C of UEC's PAA1 application, and noted that available information in Appendix C indicates wells have screen lengths of 20 feet, which is less than half the 45 to 50 foot thickness of Sand B. GCGCD emphasized the importance of knowing what the screen length is in these wells to determine if samples collected from these wells were obtained from the entire thickness of Sand A and Sand B. GCGCD stated that the NRC has discussed the importance of screening the entire thickness of the sand unit at the well to ensure representative groundwater samples are collected.

Response 22
Appendix C of the application contains completion reports for these wells. Based on these records, Sand A varies in thickness from about 55 feet to 60 feet. Well screen lengths in the OMW wells are 20 feet in length, and have been set across the lower portion of Sand A. Sand B ranges in thickness from 42 to 62 feet across the proposed production area, with an average thickness of about 48 feet. Well screens in the BMW wells are 20 feet in length and are set across the central or lower part of Sand B. Baseline well screen lengths were provided in Response 15.

On pages 5-42 and 5-43 of the guidance document referenced above by GCGCD, the NRC provides a discussion on screen lengths. For most situations, the NRC favors wells that are screened over the entire thickness of the aquifer being monitored (generally referred to as "fully penetrating wells") because fully penetrating wells will provide a groundwater sample from the entire thickness of the unit being monitored. However, NRC cautions that in fully penetrating wells, the concentration of indicator parameters may be diluted and therefore may not provide timely warning that an excursion is

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[22] US NRC, 2003, *Standard Review Plan for In Situ Leach Uranium Extraction License Applications*, NUREG-1569.
[23] US EPA, 1992, *RCRA Ground-Water Monitoring: Draft Technical Guidance.*
[24] Available at:
http://www.tceq.state.tx.us/permitting/waste_permits/uic_permits/UIC_Guidance_Class_3.html

occurring. The NRC did state that with a fully penetrating well, an excursion would eventually be detected. According to the NRC, samples from wells that are screened over a portion of the aquifer being monitored ("partially penetrating well"), usually over the zone being mined, would suffer less from dilution, but may miss an excursion if it passed above or below the screen. The NRC emphasized that partially penetrating wells only sample the zone of extraction.

According to the application, UEC does not intend to perform *in situ* mining within Sand B, the production zone, over the entire 40 to 50-foot thickness of the sand. Screens in the injection and production wells would be installed across zones that UEC has determined contain sufficient mineralization to warrant mining. Injected mining fluids tend to travel from the screened interval in the injection well to the screened intervals in the adjacent production wells, although some vertical mixing will occur within Sand B. A plume of mining fluid migrating outward from the production area would expand both horizontally and vertically within Sand B. Given that the 20-foot screens in the production zone monitor wells cover 40 to 50% of the thickness of Sand B, such a plume would most likely intercept the screened interval of a monitor well, allowing for detection of the excursion. Screening the entire thickness of Sand B in the production zone monitor wells would result in diluting the groundwater sample.

The OMW wells are screened across the lowermost part of Sand A (see also Response 84), which will provide early indication of an excursion from Sand B to Sand A, should one occur.

Comment 23

GCGCD commented that the well logs and completion reports for the PTW (Pump Test Wells) wells indicate that they were screened only in the lower half of Sand B, generally across the ore-rich zones. GCGCD also noted this was true for the RBLB wells.[25] GCCGD contends this produces sample results that are biased high, and notes that NRC recognizes this bias, and states that fully screened intervals provide samples that are more representative of groundwater quality.[26] GCGCD stated that fully screened interval, or multiple shorter screened intervals through the entire thickness of sand are the only methods to ensure representative samples, and therefore the analytical results from samples collected from the PTW and RBLB wells are invalid for calculating pre-mining groundwater quality. Lastly, GCGCD stated that a similar conclusion applies to the analytical results for the BMW and OMW wells if the respective screened intervals in these wells do not span the entire sand thickness.

Response 23

The PTW wells are screed across the ore-bearing zones because it is these zones that will be mined and will be affected by the mining fluids, and it is these zones that will have to be restored. Therefore, it is the pre-mining groundwater quality of these zones that must be determined.

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[25] UEC Class III Injection Well Application.

[26] NUREG-1569, *Standard Review Plan for In Situ Leach Uranium Extraction License Applications*, pg. 5-43.

The Executive Director notes that if pre-mining groundwater quality was based on samples from fully penetrating wells, a determination of restoration would also be determined on samples from those same wells.

Comment 24

GCGCD commented that one sample from each well is insufficient for determination of pre-mining groundwater quality because drilling of the wells disturbed the aquifer, and seasonal variation in water quality may occur. GCGCD stated that a minimum of four samples must be collected from each well, with adequate time between samples to identify anthropogenic or natural variations, as recommended by the NRC.[27] GCGCD noted that the EPA recommends a minimum of eight samples over a period of one year.[28] GCGCD commented that one sample per well, along with the possibility that the wells were incompletely developed, make the conclusions regarding water quality presented in Section 5.0 of UEC's application invalid.

Response 24

As discussed in Response 18, the Executive Director finds the methods UEC used to develop the wells to be acceptable, and does not agree that these wells were incompletely developed. With regard to GCGCD's reference to EPA guidance, the specific reference cited by GCGCD was on page 78 of the guidance document,[29] which contains part of the discussion of the use of control charts for groundwater monitoring. Upon review of the portion of the EPA document cited by GCGCD, the Executive Director did not find the basis for GCGCD's assertion that the EPA recommends a minimum of eight samples over a period of one year. However, the Executive Director acknowledges that the EPA emphasizes that estimates of the background mean and variance are improved by additional data collected over time.

The collection of multiple samples from each well generally is required if the statistical method to be used requires estimates of the mean and standard deviation from each well, such as in the use of ANOVA,[30] or in the case of the use of an intra-well comparison methodology.[31] UEC's statistical method, which is discussed in Response 74, is based on the data from all 18 baseline wells. Therefore, estimates of the mean and standard deviation from each well are not necessary.

Comment 25

GCGCD commented that according to EPA[32] and the American Society for Testing and Materials (ASTM)[33] guidance documents, use of the mean or standard deviation to

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[27] Ibid, pg. 5-39.

[28] EPA, 1992, *Addendum to Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities*, OSW, page 78.

[29] Ibid, and Comment 5, GCGCD 07/10/09 comment letter on UEC's PAA1 application.

[30] EPA, 1989, *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities*, OSW, page 5-5.

[31] Ibid, page 7-1.

[32] EPA, 1989, *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities*, OSW.

[33] American Society for Testing of Materials (ASTM), 1998, *Standard Guide for Developing Appropriate Statistical Approaches for Ground-Water Detection Monitoring Programs*, D6312.

establish pre-mining groundwater quality is applicable only if the data are from a normal or lognormal distribution. GCGCD commented that UEC did not perform a valid statistical test to demonstrate whether the groundwater quality data were characterized by either a normal or lognormal distribution. GCGCD advocated use of the Shapiro-Wilk Test, performed at a type 1 error rate of 0.05 to determine whether or not UEC's groundwater data could be characterized as normally- or lognormally-distributed. GCGCD emphasized that when data cannot be characterized as being either normally- or lognormally distributed, use of the mean or standard deviation are meaningless, as these two parameters are defined only for a normal or lognormal distribution.

Response 25

The Executive Director agrees that UEC did not evaluate the baseline data for normality, and agrees that use of the Shapiro-Wilk tests at a type I error rate of 0.05 is an acceptable method on which to base a decision as to the normality or lognormality of a data set. However, a determination of normality is necessary when a parametric statistical test is used that requires the data to be normally distributed (such as the student t-test, a parametric tolerance interval, or a parametric prediction interval).

With regards to data for which normality and lognormality can be rejected based on the Shapiro-Wilk Test, the Executive Director does not agree that in this case use of the mean or standard deviation is meaningless. Any continuous distribution has a true mean and a true standard deviation,[34] and the value of each of these parameters can be estimated using the statistical estimators *x-bar* and *s*, respectively. The fact that a distribution is not defined by μ or σ (or both), as are the normal and two-parameter lognormal distribution, is not an indication that the distribution has no true mean or true standard deviation.

Comment 26

GCGCD commented that data for which normality and lognormality can be rejected based on the Shapiro-Wilk Test must be analyzed using nonparametric statistical techniques, and advocated methods based on the median or on the interquantile range (IQR), as the median and IQR are better indicators of the distribution in a non-normal, asymmetric distribution, as they are influenced by extreme values to a lesser degree than the mean and standard deviation.

Response 26

The Executive Director agrees that data for which normality or lognormality has been rejected are best analyzed using nonparametric hypothesis tests. However, the Executive Director does not agree that use of the sample mean or IQR is necessary when normality and lognormality of the data are rejected based on the Shapiro-Wilk Test. The Executive Director notes that the two methods mentioned by GCGCD, the interquantile range and the median,[35] are statistical estimators, not hypothesis tests. A comparison of future sample medians or IQRs each would represent a hypothesis test, just as comparison of future estimates of the mean to the pre-mining mean is an hypothesis test.

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[34] The standard deviation of a distribution is equal to the square root of the variance.

[35] The interquantile range is used to estimate the spread in a distribution, and the median is used to measure central tendency of a distribution.

Comment 27

Based on GCGCD's own evaluation, GCGCD commented that because UEC did not use valid statistical methods, did not provide completion reports for all baseline wells, did not discuss well development, used improper screen intervals, and used an insufficient number of samples, there is not a valid data set from the OMW wells, which are for monitoring the overlying Sand A, for the BMW wells, which are for monitoring Sand B, the production zone, or for the PTW and RBLB wells, which are for baseline determination. Therefore, according to GCGCD, any statistical calculations done using these data will provide invalid results.

For the purpose of demonstrating, proper statistical methods, GCGCD evaluated the distributional characteristics of the BMW well data, noting however that the results have not scientific validity due to the deficiencies noted in the preceding paragraph.

Using the Shapiro-Wilk Test,[36] GCGCD evaluated the groundwater data for 22 of the 26 constituents from the production zone monitor wells (the BMW wells) for distributional characteristics. For each constituent, GCGCD calculated a p-value[37] both for the original data and for the log-transformed data. The following methodology was used by GCGCD to evaluate the distributional characteristics for each constituent data set:

P-value for original data set is greater than 0.05 and p-value for log-transformed data set is less than 0.05—data are assumed to be from a normal distribution;

P-value for original data set is less than 0.05 and p-value for log-transformed data set is greater than 0.05—data are assumed to be from a lognormal distribution;

P-value for both the original and log-transformed data sets is greater than 0.05, but p-value for original data set is greater than p-value for log-transformed data set— data are assumed to be from a normal distribution;

P-value for both the original and log-transformed data sets is greater than 0.05, but p-value for original data set is less than p-value for log-transformed data set— data are assumed to be from a lognormal distribution;

P-value for both the original and log-transformed data sets is less than 0.05— data are assumed to be from neither a normal or lognormal distribution.

GCGCD concluded that the data for calcium, magnesium, sulfate, chloride, and total dissolved solids each could be characterized as being from a normal distribution, and sodium bicarbonate, manganese, and uranium each could be characterized as being from

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[36] EPA, 1992, *Statistical Analysis of Ground-water Monitoring Data at RCRA Facilities*, Draft Addendum to Interim Final Guidance, pages 9-12.

[37] The p-value is the smallest level of significance at which the null hypothesis would be rejected when a specified test procedure is used on a given data set (*Probability and Statistics for Engineers*, 1987, Devore, J. L., 2nd ed., Brooks/Cole Publishing Co., Monterey, CA.)

economic issues as well as health issues. Also, the Bettges commented that any contamination of their underground water supply or the environment, or any perception of such contamination, will reduce the market value of their land. Monica Diaz Black commented that mining in this area would be terrible for tourism, and that people would not want to move to Goliad County to live.

Response 29

UEC analyzed a sample of groundwater from the Anklam's water well and provided the results in Table 5.1 of the application for Class III injection well area permit. The results of this analysis indicate that at the time this well was sampled, water from the Anklam's well met primary drinking water standards for inorganic constituents identified in 30 TAC Chapter 290, Subchapter F.[41] The Executive Director regrets that public fears regarding the proposed activity may be affecting the price the Anklam's livestock and their business. Such perceptions are not consistent with the history of *in situ* uranium mining in South Texas. Nevertheless, the proposed production area authorization does not authorize UEC to cause economic injury. The rules and the draft area permit specifically provide that the permit does not authorize any injury to persons or property or an invasion of other property rights, or infringement of state and local law or regulations, but the TCEQ does not have jurisdiction over the award of civil damages from injury to persons or property.

Comment 30

Larrie and Brenda Brysch emphasized that they depended on groundwater for their livelihood as ranchers. Ted Long stated that depletion of the aquifer will cause severe economic hardship as well as quality of life hardships for landowners in the area, and asked how UEC plans to compensate landowners for loss of their groundwater and reduced property values.

Response 30

The TCEQ does not regulate the use of groundwater. The TCEQ's injection well permit rules and the draft PAA impose no limits on the amount of groundwater a landowner is allowed to pump from his or her wells. The TCEQ's jurisdiction is established by the legislature and is limited to the issues set forth in statute. Accordingly, the TCEQ does not have jurisdiction to consider the effects on property values when determining whether to approve or deny a PAA application. The rules and the draft Class III injection well area permit specifically provide that the permit does not authorize any injury to persons or property or an invasion of other property rights, or infringement of state and local law or regulations.

Comment 31

Brenda Jo Hardt commented that the TCEQ must consider the water needs of existing industries, and asked how the TCEQ can justify economic development of uranium and at the same time ruin the agricultural use of land and clean water. Ms. Hardt noted that

[41] The Executive Director notes that these standards apply to public drinking water systems. Private water wells are not regulated by the TCEQ.