UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

SUBJECT: William Dick Lagoons Site
OU-03 Soil Remediation
Vinyl Chloride Soil Cleanup Standard

DATE: OCT 13 2006

SDMS DocID 2070822

FROM: Pat McManus, RPM
Eastern PA Remedial Branch, 3HS21

TO: File

THRU: Peter Ludzia, Chief
Eastern PA Remedial Branch, 3HS21

The William Dick Lagoons Superfund Site is located in West Caln Township, Chester County, Pennsylvania. The site consists of three former lagoons that received waste rinse-water from the clean out of chemical delivery trucks operated by Chemical Leaman Tank Lines, Inc. from the late-1950s through 1970. The rinse-water contained residue of the chemicals that were transported by the delivery trucks. It is also believed that chlorinated solvents were used to clean and rinse out the delivery trucks.

In 1993, EPA issued a Record of Decision (ROD) that specified remedial action for the cleanup of contaminated soil and the "tarry/latex" sludge that was contained in the three former lagoons at the site. The ROD established soil cleanup standards for 48 chemical contaminants. In 1995, EPA entered into a Consent Decree with Chemical Leaman Tank Lines, Inc. (now Quality Distribution, Inc.(QDI)) under which they agreed to complete the required soil cleanup activity. Thereafter, EPA also issued an Explanation of Significant Differences (ESD) that required the treatment of "tarry/latex" material and overlying soils in the lagoons by utilizing on-site low temperature thermal desorption treatment (thermal desorption) technology. If the "tarry/latex" material could not be treated with the thermal desorption treatment system, then it would be shipped off-site for treatment/disposal as a hazardous waste. After the thermal desorption treatment was completed, soil vapor extraction/biological (SVE/BIO) technology was to be used to treat the underlying soils and the cleanup standards specified in the ROD were to be achieved within 18 months of the start of the SVE/BIO system. If SVE treatment fails to meet the cleanup standards within that time frame, then thermal desorption must be utilized to complete treatment of the soils.

Shaw Environmental, Inc. (Shaw) was hired as the remediation contractor by QDI to design and implement the soil remedial activities. The thermal desorption treatment portion of the soil remedy began in late 2003 and was completed in the summer of 2005. Following the completion of the thermal desorption treatment portion of the remedy, the SVE/BIO system was redesigned and constructed. Operation of the SVE/BIO system began in March 2006. During the startup/testing period of the system, samples were taken to verify that the system was operating as designed. Samples collected included water from the heated SVE storm water collection system and air samples from the carbon treatment system. The sample results indicated the presence of vinyl chloride in the storm water that passed through the contaminated soil in the heated SVE treatment cell and in the air stream at the carbon filtration system. It was concluded that degradation of site-related chlorinated solvent contaminants in the soil was occurring and that may have resulted in the formation of the vinyl chloride. Vinyl chloride had not previously been identified as a site-related contaminant and, therefore; no soil cleanup level had been developed for vinyl chloride in the ROD. Also, vinyl chloride was not found at detectable levels during the cleanup verification sampling conducted during the thermal desorption phase. Therefore, EPA requested that QDI develop a soil cleanup standard for vinyl chloride so that it could be verified that the level of vinyl chloride that remained in the soil after the SVE/BIO treatment was completed would be protective of human health and the environment.

Shaw, on behalf of QDI, submitted a proposal for a vinyl chloride soil cleanup level on August 3, 2006. The method and calculations utilized to develop the proposed vinyl chloride cleanup level is summarized in a report entitled "Calculation of Vinyl Chloride Cleanup Level" (Attachment 1). That document was reviewed by the EPA Toxicologist and Hydrogeologist, and they concluded that the proposed soil cleanup level was appropriately calculated and will be protective (Attachments 2 and 3).

After discussing this revised soil cleanup standard with management in the Office of Superfund Site Remediation, it was decided that this memorandum would be sufficient to document this relatively minor change to the remedy. A soil cleanup level for MIBK was modified on November 4, 2005 for this site at QDI's request using this same mechanism. Therefore, a soil cleanup level for vinyl chloride of 15.0 µg/Kg is hereby established for the William Dick Lagoons Superfund Site.

cc: Dawn Ioven, 3HS41
Kathy Davies, 3HS41
Bernice Pasquini, 3HS41

Attachment 1 - Calculation of Vinyl Chloride Cleanup Level in Soil; August 3, 2006
Attachment 2 - E-mail from Dawn Ioven, Toxicologist
Attachment 3 - E-mail from Bernice Pasquini, Hydrogeologist

ATTACHMENT 1

CALCULATION OF VINYL CHLORIDE CLEANUP LEVEL IN SOIL

WILLIAM DICK LAGOONS SUPERFUND SITE OPERABLE UNIT NO. 3

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August 3, 2006
(Rev. 0)
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1.0 INTRODUCTION

The modeling study undertaken and described herein was designed to evaluate the leaching of vinyl chloride from soils at the William Dick Lagoons site following a full-scale Soil Vapor Extraction/Enhanced In-Situ Biodegradation SVE/BIO) remediation effort. The Pennsylvania Department of Environmental Protection (PADEP), formerly the Pennsylvania Department of Environmental Regulation (PADER) and the United States Environmental Protection Agency Region III (EPA) have approved a work plan dated 07/09/92 (ERM, 1992) which describes the procedures for this modeling study. The endpoint evaluated herein which the remedial effort must meet is non-exceedance of promulgated State or Federal Maximum Contaminant Levels (MCLs) as a result of leaching of residual organic constituents in soils.

2.0 CONCEPTUAL MODEL

The conceptual model of the migration of residual soil contaminants from site soils into groundwater is discussed in detail in the original Feasibility Study (ERM, 1990) and in the work plan for this study (ERM, 1992). In summary, the conceptual model employed in determining cleanup levels for the site is:

1. With no cap in place, a simple surface hydrologic balance incorporating runoff and evapotranspiration describes the amount of infiltration.

2. Residual vinyl chloride in soil, following full scale soil remediation, desorbs and dissolves into water infiltrating through the site. The concentrations of vinyl chloride in water percolating below the former lagoon zone are linearly related to the residual concentrations in the soil. (Note: some of the residual contamination in soil will not desorb - i.e. there is a portion of the contaminant mass which is irreversibly adsorbed to the soil.)

3. The vinyl chloride concentrations in the percolating water are reduced as travel occurs from the bottom of the former lagoon zone to the ground water table via natural microbial action as well as volatilization. Although volatilization of vinyl chloride can be a major attenuation process and can be modeled in PRZM3, volatilization was not included in this modeling effort to be consistent with previous FS modeling at the site. (Note that the original PRZM model used in 1992 did not have the capability to model volatilization.)

4. When the percolating water reaches the water table, it undergoes a mixing process prior to the point where ground water must meet the appropriate endpoint concentrations. The degree of mixing is directly proportional to the ratio of the infiltration rate and the ground water flow rate.

The components of the conceptual model, and the models which have been approved to quantify them, are summarized from the work plan in Table 1.

Table 1 Conceptual Model Components	
Conceptual Model Component	**Quantitative Model**
Infiltration	No Cap – Surface Water Balance (from FS)
Leaching from Lagoon Soils and Transport to Vadose Zone	Pesticide Root Zone Model (PRZM3 V3.12.2)
Transport to Groundwater	Vadose Zone Flow and Transport Model (VADOFT)
Mixing in Groundwater	Mass Balance (from FS)

3.0 SURFACE WATER BALANCE

The cleanup levels report contained in the original FS presented a detailed discussion of a surface water balance calculated for the uncapped site. The calculations concluded that a total of 13.3 inches of water would infiltrate through the site under natural conditions on an annual average basis.

4.0 UNSATURATED ZONE TRANSPORT

The PRZM3 model was designed to simulate the movement of applied pesticides through the root zone and underlying soil zones under the influence of Infiltration, soil erosion, decay, adsorption, and plant interaction. The model is compartmental, and simulates transient chemical movement through time using a daily time step. The model is readily applicable to the movement of non-pesticide compounds, and can be configured to ignore plant interactions. In addition, the model can easily be configured to simulate an initial condition representing residual chemicals in soil rather than applied pesticides at the surface.

The PRZM3 model is maintained by the USEPA on the Center for Exposure Assessment Modeling (CEAM) bulletin board. The use of the model was recommended by the CEAM staff, and was approved in the work plan. The PRZM3 model is the most recent version of a modeling system that links two models – PRZM and VADOFT – in order to predict contaminant transport and transformation down through the crop root and unsaturated zone.

4.1 Model Inputs

A listing of PRZM3 model input files are included as Attachment 1. Two input files are required. One input file defines parameters for modeling the root zone needed for PRZM routine. The second input file defines parameters for flow and transport in the vadose zone below the root zone. For this modeling effort, the root zone is defined as the horizon containing loamy lagoon material. The values for the important input variables are discussed below.

4.1.1 Meteorological Data

Meteorological data for the PRZM model consists of daily records of precipitation, pan evaporation, and ambient temperature. The modeling protocol specified that the hydrologic portion of the PRZM model would be bypassed, and that total infiltration would be input to the model in place of precipitation.

The monthly infiltration estimates from the FS were used as input to the PRZM model in place of precipitation data. The total infiltration each month was divided equally for the number of days in the month and input as precipitation (treated as infiltration). The pan evaporation data were entered as zero on each day to bypass evapotranspiration calculations in the model and treat entered precipitation data as infiltration rate. Temperature data were irrelevant as evapotranspiration calculations were bypassed. A total of 99 years of meteorological data were created for this simulation. The data for the first year are included in Attachment 1.

4.1.2 Soil/Crop Data

The PRZM model can incorporate the effects of crops on the uptake and movement of chemicals in the root zone, as well as their effect on soil erosion and runoff. The expected condition of the site following full scale remediation is grassy and gently sloping. The effects of plant uptake on chemical movement were disregarded in the model, as contaminated soils could be as deep as 10 feet, below the root zone. Chemical loss via soil erosion was also not modeled.

The soil column at the site was represented in the model using two soil horizons. The upper soil horizon represents the loamy lagoon material, and the lower horizon represents the natural soil/saprolite beneath the lagoons which grades into the fractured quartzite as the depth increases. The important soil characteristics in the PRZM model are the organic carbon fraction; the initial water content, the field capacity water content, and the wilting point water content. The model also uses the bulk density of the soil and the thickness of the soil horizon. The values of these parameters used in the model are summarized below. The fraction of organic carbon in each horizon was derived from field data collected during the SVE pilot test, which indicated the mean organic carbon content in the upper zone of 1.95% and in the lower zone of 0.08%. In addition, the field data indicated an average moisture content of 14%. The model was set up assuming that moisture content is initially at field capacity. This creates additional drainage during the initial phases of the model run and thus is a conservative assumption.

Table 2 PRZM Model Soil Column Parameters		
Soil Parameter	**Model Input Values**	
	Soil Horizon 1 – Lagoon Materials	**Soil Horizon 2 – Vadose Zone Below Lagoons**
Thickness	305 cm (10 feet)	1128 cm (37 feet)
Bulk Density	1.2 g/cm^3	1.3 g/cm^3
Field Capacity	28.8%	25.1%
Wilting Point	14.8%	13.1%
Initial Water Content	28.8%	25.1%
Organic Carbon Content	1.95%	0.08%

The soil column modeled in the FS was 55 feet in total length (10 feet of Lagoon material and 45 feet of vadose zone below the lagoons), which reflects the average depth to ground water beneath the site. Due to enhancements to the PRZM3 model, limitations of 100 compartments, and properties of vinyl chloride, the maximum soil column that could be modeled was 47 feet (10 feet of lagoon and 37 feet of vadose zone below the lagoons) before encountering "single precision overflow" error due to very small numbers. The soil horizon 1, Lagoon materials, was divided into 61 compartments each of 5 centimeters (cm) and the soil horizon 2, vadose zone below the lagoons, was divided into 98 compartments to increase the accuracy of the model calculations.

4.1.3 Model Timing

The PRZM3 is restricted to a maximum run period of 100 years (1/1/1900 through 12/31/1999). The vinyl chloride model calculations were run for the 99 year period (1/1/01 to 12/31/99), although vinyl chloride had already moved through the column in less than 50 years.

4.1.4 Chemical Data

Chemical parameters input to the PRZM model are:

- Initial concentrations
- Chemical application rate (source term)
- Soil/water partitioning coefficients; and
- Gross first-order decay rates.

These parameters are input for each soil horizon. The user may specify initial concentrations of the chemical in each soil compartment, or time-dependent loadings of the chemical at the soil surface. The PRZM model requires that the chemical be applied at least once during the simulation. Therefore, in this simulation, initial vinyl chloride concentration was set to zero and 36.6 kilograms per hector of vinyl chloride was applied on day one of the simulation and distributed evenly across 10-foot thick soil horizon 1, the lagoon materials. This resulted in vinyl chloride concentration of 1.0 mg/kg in each of the soil compartments of soil horizon 1 – the lagoon material. This is a conservative assumption as vinyl chloride concentration is upper portions of the lagoons will be zero due to volatilization. The output of the PRZM3 model (i.e., the maximum dissolved concentration reaching the water table) is linearly proportional to this assumed initial soil concentration. The soil cleanup levels are derived by taking the ratio of the allowable concentration at the water table to the predicted concentration at the water table and multiplying the initial soil concentration by that ratio (see Section 6.0). Therefore, the assumed initial soil concentration is not important, and can be set at any convenient number.

The linear equilibrium partitioning equation was used to define relationship between the concentration of vinyl chloride in soil and the concentration of vinyl chloride in water infiltrating through site soils. The equation is as follows:

$$C_w = \frac{C_s}{K_d} \qquad (1)$$

where C_W is the vinyl chloride concentration in the infiltrating water in milligrams per liter (mg/L), C_S is the residual soil concentration in milligrams per kilogram (mg/kg), and K_d is the soil/water partitioning coefficient (L/kg). The K_d was determined by multiplying the organic carbon partitioning coefficient, K_{OC} (independent of soil type, and widely available in the scientific literature), by the soil organic carbon content. The K_{OC} value for vinyl chloride is 2.45 (Montgomery, 1996).

Soil sampling conducted during the SVE/BIO pilot study showed two distinct soil zones distinguished by the organic carbon content of the soil. The upper zone, corresponding to the silty-loam of the former lagoon soils, showed a mean organic carbon content of 1.95%. The lower zone, corresponding to the weathered saprolite, showed a mean organic carbon content of 0.08%. The resulting K_d values were 0.048 L/Kg for the lagoon soils and 0.002 L/kg for the soils in the lower zone.

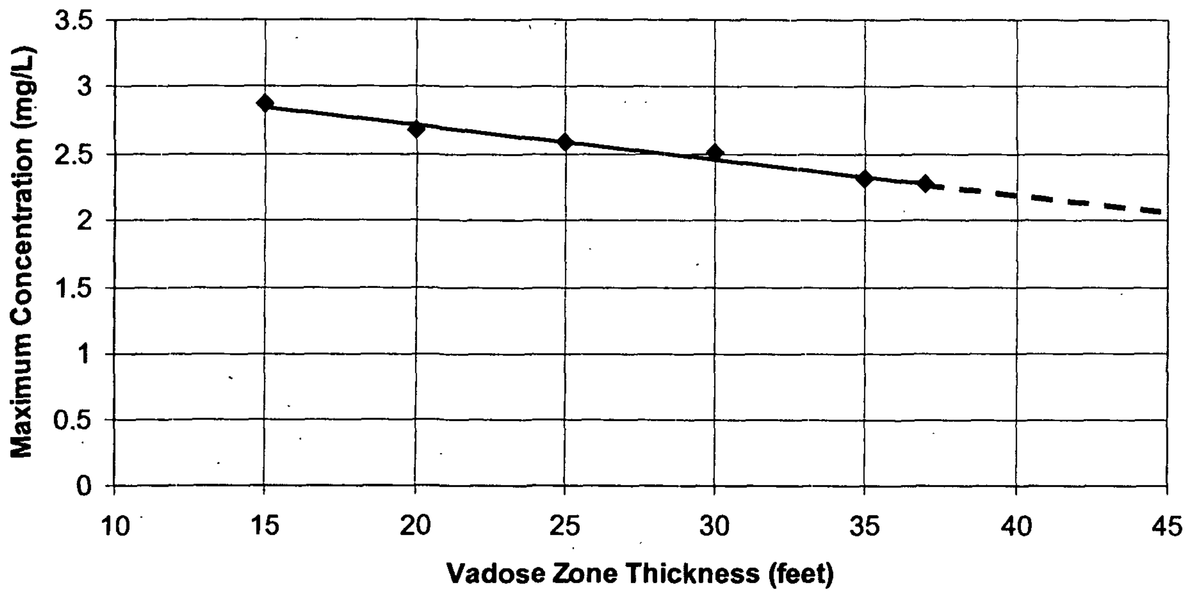
The reported half life for vinyl chloride degradation is 5 years. This is equivalent to a first-order degradation rate constant of 0.00038 per day. The degradation rate includes vinyl chloride loss due to biodegradation as well as other losses. Vinyl chloride degradation was specified only in the dissolved phase. It was assumed that vinyl chloride does not degrade in adsorbed phase. Note that volatilization of vinyl chloride was not simulated.

4.2 PRZM / VADOFT MODEL RESULTS

The maximum concentration in the pore water as a function of depth is summarized in Table 3 and plotted in Figure 1. Figure 1 shows that as thickness of the vadose zone below the lagoon material increases, the maximum vinyl chloride concentration decreases. As the thickness of the vadose zone below the lagoons increase beyond 30 feet, further reduction in the maximum vinyl chloride at a depth decrease only slightly. Therefore, using the maximum concentration of vinyl chloride in pore water for vadose zone thickness in setting cleanup goals is conservative, and will be used in Section 6.0.

Table 3 PRZM / VADOFT Predicted Maximum Vinyl Chloride Concentrations as a Function of the Thickness of the Vadose Zone Below the Lagoons	
Thickness of the Vadose Zone Below the Lagoons (feet)	Predicted Maximum Vinyl Chloride Concentration (mg/L) in the Pore Water at the Bottom of the Vadose Zone Below Lagoon Materials if the Initial Soil Concentration in the Lagoon Material was 1 mg/Kg
15	2.879
20	2.676
25	2.589
30	2.509
35	2.319
37	2.274

Figure 1
Predicted Maximum Vinyl Chloride Concentration in the Pore Water at the Bottom of the Vadose Zone Below Lagoon Materials if the Initial Soil Concenetration in the Lagoon Material was 1 mg/Kg



5.0 MIXING IN GROUNDWATER

The degree of dilution expected as slowly infiltrating rain water mixes with more rapidly flowing groundwater is calculated using a simple mass balance approach. Again, the details are presented in the FS report, and can be summarized by the equations for calculating the dilution factor:

$$DF = \frac{Q_{gw} + Q_i}{Q_i} \qquad (2)$$

where DF is the dimensionless dilution factor, Q_{gw} is the ground water flow rate beneath the site (ft^3/yr), and Q_i is the total infiltration flow rate through the site (ft^3/yr). The ground water flow rate was calculated to be 2.01 x 10^6 ft^3/year previously based on the hydraulic conductivity and gradient in the phreatic aquifer underlying the site. The infiltration flow rate is calculated from the Infiltration rate and the site area:

$$Q_i = Inf * 1.25Ac * 43{,}560 ft^2 /\mathrm{Ac} \qquad (3)$$

where Inf is the calculated infiltration rate for a no cap scenario, converted to ft/yr. The calculated dilution factor for the no cap scenarios is 34.3, as reported in the FS, Appendix C.

The ground water concentration resulting from a given concentration of a compound in the infiltrating water is calculated as:

$$C_{gw} = \frac{C_w}{DF} \qquad (4)$$

where C_{gw} is the concentration in ground water (mg/L) and C_w is the pore water concentration at the bottom of the vadose zone as calculated by VADOFT model within the PRZM3 model.

Given the acceptable concentrations in ground water (AGWC) for vinyl chloride is established by the state MCL as 1 micrograms per liter (µg/L), the maximum acceptable concentrations in infiltrating water (AIC) reaching the ground water table (i.e. prior to mixing in ground water or C_w in equation 4) was calculated as follows:

AIC = AGWC*DF = 34.3 * 1 µg/L = 34.3 µg/L .... (5)

6.0 SUMMARY OF SOIL CLEANUP LEVELS

The soil cleanup levels required to meet the acceptable groundwater concentration were calculated using all of the above procedures. The cleanup level or acceptable soil concentration was calculated as follows:

$$ASC = 1.0(mg/kg) * \frac{AIC(mg/L)}{C_{PRZM}(mg/L)} \qquad (6)$$

The 1 mg/kg in equation (6) represents the input soil concentration in the PRZM3 model, AIC represents the acceptable infiltration concentration reaching the water table (AIC, from equation 5), and C_{PRZM} is the maximum infiltration concentration reaching the water table predicted by the PRZM model based on a 1 mg/kg residual soil concentration. The fact that the PRZM model output is linearly proportional to the initial soil concentration allows this ratio approach to be used. Using AIC value of 34.3 µg/L from Equation (5) and the maximum pore water concentration corresponding to 37-foot thick vadose zone below the lagoons from Table 3, the cleanup level or acceptable soil concentration for vinyl chloride is 0.015 mg/Kg or 15 µg/Kg.

010101	0.2155	0.00	3.5	727.0	99.8	1.0	99.9	82	8	4.9	0.033	8.4	320
010201	0.2155	0.00	-0.5	289.7	189.4	0.8	102.1	65	3	0.3	0.031	3.8	20
010301	0.2155	0.00	-0.4	349.4	126.0	0.8	102.0	59	8	1.0	0.152	3.9	305
010401	0.2155	0.00	-3.7	671.9	178.7	1.1	101.7	57	4	-2.7	0.103	8.7	305
010501	0.2155	0.00	-2.7	350.3	151.2	1.0	102.3	55	6	-1.3	0.082	3.8	250
010601	0.2155	0.00	1.6	312.0	178.2	1.0	101.6	68	3	4.0	0.038	5.0	250
010701	0.2155	0.00	4.2	377.6	193.1	1.2	101.4	64	2	7.3	0.052	4.3	250
010801	0.2155	0.00	2.2	758.0	128.5	1.6	101.1	56	6	4.1	0.066	9.7	290
010901	0.2155	0.00	-3.8	736.6	235.9	1.4	102.5	48	1	-3.9	0.028	8.9	340
011001	0.2155	0.00	-3.3	307.0	200.5	1.1	103.0	44	4	-1.2	0.028	3.4	320
011101	0.2155	0.00	0.0	391.8	184.4	1.1	102.3	62	3	2.2	0.088	4.8	250
011201	0.2155	0.00	1.3	329.8	224.3	1.3	102.5	46	1	4.4	0.072	6.0	20
011301	0.2155	0.00	0.7	202.3	206.5	0.7	102.6	73	3	4.2	0.043	3.3	200
011401	0.2155	0.00	5.2	349.9	96.5	0.4	101.5	93	10	5.4	0.114	2.4	70
011501	0.2155	0.00	2.0	987.6	69.8	0.6	100.7	86	10	1.8	0.076	11.6	70
011601	0.2155	0.00	-0.7	443.7	126.4	0.6	100.9	83	10	-0.6	0.137	3.9	0
011701	0.2155	0.00	1.0	467.4	225.9	1.0	101.2	79	2	1.8	0.028	4.9	240
011801	0.2155	0.00	3.5	524.8	179.0	1.5	101.3	60	4	5.5	0.049	6.6	320
011901	0.2155	0.00	-4.6	758.0	112.1	0.6	101.2	84	10	-5.0	0.028	7.2	70
012001	0.2155	0.00	-9.5	857.3	257.6	0.6	100.2	68	4	-8.2	0.050	9.6	340
012101	0.2155	0.00	-11.3	261.9	246.6	0.7	101.4	54	4	-9.1	0.039	2.7	290
012201	0.2155	0.00	-12.1	493.4	269.6	0.7	101.9	54	0	-10.0	0.063	7.0	290
012301	0.2155	0.00	-10.4	273.8	184.2	0.4	101.4	81	6	-7.9	0.088	2.8	70
012401	0.2155	0.00	-8.6	497.9	142.7	0.6	101.3	76	8	-5.5	0.076	7.2	320
012501	0.2155	0.00	-12.6	594.9	288.2	0.9	103.4	43	0	-12.0	0.037	6.6	320
012601	0.2155	0.00	-10.5	323.9	143.0	0.5	102.3	67	10	-9.2	0.033	3.1	70
012701	0.2155	0.00	-9.2	539.8	202.4	0.7	101.4	62	6	-7.9	0.033	6.5	320
012801	0.2155	0.00	-10.9	524.8	265.7	0.9	101.8	47	2	-9.5	0.159	6.7	290
012901	0.2155	0.00	-7.9	443.7	258.1	1.0	102.0	48	2	-5.4	0.116	5.8	290
013001	0.2155	0.00	-8.3	468.3	270.9	0.9	102.6	50	1	-6.5	0.032	6.4	340
013101	0.2155	0.00	-5.2	524.3	186.1	1.0	102.2	56	8	-3.7	0.047	6.4	270
020101	0.2304	0.00	-7.6	591.7	153.0	0.9	102.1	56	10	-7.4	0.046	5.9	20
020201	0.2304	0.00	-13.5	470.6	276.2	0.8	103.3	38	2	-12.4	0.046	4.6	0
020301	0.2304	0.00	-7.7	766.7	142.0	0.6	103.0	74	10	-8.6	0.096	7.8	70
020401	0.2304	0.00	-0.4	1001.3	180.9	0.9	101.0	80	10	-0.7	0.092	11.5	0
020501	0.2304	0.00	-2.3	466.5	314.3	1.5	103.1	44	0	0.1	0.068	6.0	0
020601	0.2304	0.00	-3.5	289.7	262.2	1.1	102.8	60	5	-0.5	0.066	3.2	250
020701	0.2304	0.00	-3.4	230.5	290.6	1.1	102.8	55	5	-1.0	0.052	2.0	230
020801	0.2304	0.00	-0.6	488.3	111.6	1.2	101.0	59	10	-0.3	0.171	6.7	70
020901	0.2304	0.00	2.4	425.0	269.0	2.1	100.6	47	5	3.8	0.058	4.7	320
021001	0.2304	0.00	2.6	442.8	232.6	1.7	100.9	51	7	3.7	0.173	5.8	340
021101	0.2304	0.00	-1.2	285.6	189.3	1.1	101.8	47	9	-0.9	0.059	4.2	20
021201	0.2304	0.00	-2.3	523.4	205.0	0.9	101.9	75	10	-2.0	0.082	6.0	70

021301	0.2304	0.00	0.0	433.2	220.8	0.9	102.7	68	9	0.6	0.042	5.0	140
021401	0.2304	0.00	3.0	400.9	299.4	1.1	101.7	77	4	4.3	0.043	6.4	290
021501	0.2304	0.00	2.2	313.0	267.7	1.3	102.2	59	6	3.7	0.060	3.1	290
021601	0.2304	0.00	1.1	345.3	193.6	0.7	102.6	81	8	1.7	0.081	4.1	20
021701	0.2304	0.00	-0.4	213.2	270.5	0.6	102.5	89	5	0.0	0.098	2.8	230
021801	0.2304	0.00	6.2	258.7	142.3	0.5	101.6	96	10	6.1	0.042	2.9	230
021901	0.2304	0.00	9.7	486.5	220.6	1.6	101.3	82	8	11.9	0.134	4.9	290
022001	0.2304	0.00	2.8	324.8	219.5	1.5	103.0	57	8	3.6	0.064	3.7	320
022101	0.2304	0.00	2.0	186.8	164.1	0.8	102.8	80	10	2.2	0.038	2.2	140
022201	0.2304	0.00	3.5	247.4	181.1	0.7	102.0	88	10	4.0	0.042	3.0	250
022301	0.2304	0.00	5.9	215.0	149.6	0.7	100.8	93	10	6.8	0.048	2.3	160
022401	0.2304	0.00	9.2	282.0	300.3	2.0	101.4	76	6	11.5	0.094	3.9	230
022501	0.2304	0.00	11.1	533.4	123.8	1.1	99.5	93	10	11.7	0.053	3.1	110
022601	0.2304	0.00	5.5	1000.4	225.7	2.1	99.5	61	6	7.4	0.187	12.4	290
022701	0.2304	0.00	8.5	367.6	355.5	2.4	101.7	52	1	11.5	0.215	5.2	250
022801	0.2304	0.00	4.6	575.3	148.2	1.5	101.6	63	10	5.0	0.067	7.6	60
030101	0.1852	0.00	1.6	270.1	173.0	0.8	102.0	83	9	2.0	0.045	3.1	140
030201	0.1852	0.00	5.1	487.0	351.3	2.0	101.7	60	3	6.9	0.083	5.3	290
030301	0.1852	0.00	8.6	492.0	400.4	2.6	101.6	59	1	11.1	0.041	6.6	230
030401	0.1852	0.00	8.9	269.7	168.4	1.5	101.6	62	8	11.5	0.098	2.0	0
030501	0.1852	0.00	11.6	300.2	329.8	2.3	101.5	69	7	13.1	0.148	3.8	230
030601	0.1852	0.00	8.0	534.3	177.7	0.8	101.5	90	10	7.8	0.103	6.5	80
030701	0.1852	0.00	9.7	439.6	307.8	2.4	101.3	75	7	12.2	0.124	4.4	270
030801	0.1852	0.00	3.0	823.6	129.8	0.7	100.9	91	10	2.5	0.096	8.7	90
030901	0.1852	0.00	2.1	676.0	175.8	1.0	99.2	82	10	2.8	0.048	6.5	290
031001	0.1852	0.00	-0.9	878.3	247.7	2.0	100.9	51	7	-0.3	0.094	9.5	320
031101	0.1852	0.00	0.7	418.2	345.3	2.0	101.7	45	3	2.8	0.102	4.4	200
031201	0.1852	0.00	6.1	336.6	406.7	2.5	102.2	62	2	9.5	0.043	4.1	250
031301	0.1852	0.00	3.9	741.6	186.8	1.5	102.6	73	10	3.8	0.073	7.3	90
031401	0.1852	0.00	3.9	582.6	181.7	0.6	100.6	95	10	3.8	0.064	6.4	35
031501	0.1852	0.00	6.8	430.0	229.2	1.2	100.2	77	7	7.6	0.057	5.3	250
031601	0.1852	0.00	5.1	826.8	340.6	2.9	100.4	46	5	5.9	0.212	9.5	320
031701	0.1852	0.00	-1.1	668.7	482.0	2.6	102.4	32	0	-0.4	0.116	7.5	340
031801	0.1852	0.00	0.8	378.6	439.9	2.3	103.2	39	3	1.7	0.056	4.0	200
031901	0.1852	0.00	3.0	386.8	136.4	0.6	101.6	92	10	3.2	0.247	4.7	20
032001	0.1852	0.00	5.8	598.6	485.2	3.1	102.5	49	0	7.6	0.124	6.8	0
032101	0.1852	0.00	3.6	430.0	378.5	2.5	102.8	43	6	5.9	0.128	4.8	110
032201	0.1852	0.00	3.8	601.8	214.0	2.0	102.1	53	10	5.4	0.241	6.2	110
032301	0.1852	0.00	4.1	600.9	174.3	0.9	101.2	89	9	4.4	0.106	6.0	70
032401	0.1852	0.00	7.1	419.1	298.1	1.9	101.1	73	9	8.2	0.077	3.8	290
032501	0.1852	0.00	7.5	757.6	435.8	3.1	101.4	50	4	8.7	0.109	9.2	340
032601	0.1852	0.00	9.3	332.1	488.8	3.5	101.9	40	1	11.6	0.137	3.7	320
032701	0.1852	0.00	12.8	265.1	472.1	3.7	101.4	41	2	16.5	0.111	4.2	200

032801	0.1852	0.00	16.0	322.5	394.5	3.7	100.5	52	6	19.0	0.051	3.6	200
032901	0.1852	0.00	13.1	580.8	506.1	4.2	100.9	46	3	14.2	0.132	6.1	320
033001	0.1852	0.00	8.9	587.6	461.8	3.8	101.1	39	3	9.4	0.095	6.7	320
033101	0.1852	0.00	4.7	385.8	229.7	1.9	101.3	49	8	5.8	0.086	3.3	135
040101	0.078	0.00	5.7	737.1	200.4	1.7	99.2	78	10	6.5	0.080	6.0	90
040201	0.078	0.00	5.3	810.0	438.5	3.2	100.1	42	5	6.4	0.137	10.4	290
040301	0.078	0.00	6.6	666.5	392.3	3.4	100.1	40	6	9.2	0.234	7.5	290
040401	0.078	0.00	6.6	513.4	326.8	2.9	99.7	48	6	8.1	0.088	5.6	0
040501	0.078	0.00	7.8	463.7	406.0	2.8	100.4	50	4	9.0	0.060	6.1	320
040601	0.078	0.00	9.6	724.8	314.8	3.2	100.5	49	7	11.1	0.114	9.6	290
040701	0.078	0.00	8.1	656.0	393.1	3.7	101.1	45	7	10.4	0.181	7.5	320
040801	0.078	0.00	6.8	690.6	489.9	3.7	101.8	40	4	8.4	0.072	7.7	320
040901	0.078	0.00	6.9	416.8	415.0	3.2	102.3	45	7	8.6	0.118	3.6	160
041001	0.078	0.00	7.5	695.6	231.8	1.7	99.7	81	10	8.4	0.112	7.0	320
041101	0.078	0.00	8.3	799.0	263.1	3.0	101.0	49	7	9.4	0.197	9.1	320
041201	0.078	0.00	6.9	464.2	224.2	2.2	101.1	48	9	9.1	0.205	4.4	110
041301	0.078	0.00	4.5	892.4	171.5	1.0	98.5	89	10	4.8	0.059	9.9	70
041401	0.078	0.00	9.3	553.5	502.7	3.3	100.6	53	3	11.4	0.168	7.2	320
041501	0.078	0.00	11.2	522.5	513.2	3.4	101.0	63	5	13.3	0.072	5.6	110
041601	0.078	0.00	11.7	641.9	312.4	2.4	99.6	80	8	13.8	0.141	7.1	340
041701	0.078	0.00	9.1	468.8	394.7	3.1	100.2	50	6	11.0	0.260	6.3	180
041801	0.078	0.00	7.0	586.3	315.2	2.4	100.5	60	8	7.3	0.176	6.1	320
041901	0.078	0.00	7.4	599.5	310.9	2.6	101.8	55	8	8.9	0.100	8.0	20
042001	0.078	0.00	7.8	342.6	577.1	3.5	102.7	46	0	10.0	0.283	3.8	20
042101	0.078	0.00	10.9	579.4	515.2	4.0	102.5	49	4	13.0	0.069	6.5	230
042201	0.078	0.00	16.0	469.2	445.1	3.8	101.6	65	7	17.8	0.135	4.8	230
042301	0.078	0.00	15.9	425.5	608.7	4.7	101.5	47	1	17.3	0.142	5.1	320
042401	0.078	0.00	18.7	384.5	440.2	3.9	100.6	64	6	20.8	0.132	5.0	230
042501	0.078	0.00	19.0	456.0	402.1	4.3	100.1	59	7	21.9	0.085	6.1	250
042601	0.078	0.00	16.2	699.7	460.2	4.5	100.3	57	6	18.0	0.203	9.6	320
042701	0.078	0.00	10.8	422.7	414.7	3.7	101.9	46	6	12.2	0.089	4.7	200
042801	0.078	0.00	10.7	510.2	374.4	3.1	101.0	59	8	12.5	0.225	6.4	200
042901	0.078	0.00	9.5	763.0	377.8	3.9	100.8	43	9	11.1	0.293	8.7	340
043001	0.078	0.00	9.0	570.3	582.6	4.2	101.7	39	2	11.0	0.204	7.0	320
050101	0.00	0.00	11.0	322.5	253.2	2.1	101.4	68	10	11.9	0.103	3.5	180
050201	0.00	0.00	10.6	609.5	546.1	3.7	100.8	53	5	11.8	0.142	7.9	320
050301	0.00	0.00	10.3	711.6	514.4	4.2	101.3	45	4	12.6	0.128	9.4	290
050401	0.00	0.00	11.1	405.0	592.1	4.3	102.2	47	3	12.8	0.067	5.2	320
050501	0.00	0.00	12.9	373.5	586.6	4.7	102.8	36	2	15.2	0.079	4.5	340
050601	0.00	0.00	10.5	327.1	234.9	1.5	103.0	77	10	11.7	0.277	4.7	200
050701	0.00	0.00	15.1	348.0	339.8	2.2	101.9	88	9	16.1	0.183	3.5	240
050801	0.00	0.00	19.2	302.0	278.1	2.3	101.3	82	10	20.8	0.230	3.1	250
050901	0.00	0.00	20.4	533.9	559.9	4.6	100.8	73	5	23.0	0.163	7.0	200

051001	0.00	0.00	17.0	367.2	303.9	2.6	101.7	72	10	17.6	0.081	3.9	20
051101	0.00	0.00	13.9	574.9	222.9	1.9	102.5	79	10	14.2	0.275	5.9	70
051201	0.00	0.00	14.7	507.9	315.0	1.9	102.3	90	10	15.5	0.242	5.1	70
051301	0.00	0.00	16.8	308.9	329.5	2.1	101.8	88	10	17.3	0.223	3.6	70
051401	0.00	0.00	19.5	279.7	485.9	3.5	101.6	80	6	21.1	0.181	3.4	215
051501	0.00	0.00	19.3	404.5	543.1	4.0	101.4	76	5	20.6	0.110	4.4	190
051601	0.00	0.00	20.4	479.7	293.6	3.3	101.2	70	9	22.0	0.262	4.5	230
051701	0.00	0.00	15.2	400.0	556.3	4.4	102.3	46	3	16.7	0.117	4.0	20
051801	0.00	0.00	13.5	449.6	457.2	4.0	102.4	52	8	15.0	0.154	5.0	110
051901	0.00	0.00	11.9	365.8	333.0	2.5	101.8	71	10	12.3	0.191	3.6	110
052001	0.00	0.00	14.1	562.1	511.0	4.5	101.5	52	7	15.0	0.081	6.4	340
052101	0.00	0.00	15.2	343.9	550.8	4.5	101.1	55	6	16.8	0.116	3.9	250
052201	0.00	0.00	13.3	497.9	484.7	3.8	101.1	60	5	14.9	0.158	5.8	340
052301	0.00	0.00	13.2	348.9	545.1	4.2	101.2	58	5	14.8	0.163	4.2	0
052401	0.00	0.00	15.9	519.3	644.5	5.4	101.3	47	1	17.4	0.186	6.2	330
052501	0.00	0.00	20.0	598.1	590.5	6.3	101.2	48	3	21.9	0.102	5.9	240
052601	0.00	0.00	15.9	652.3	255.0	3.2	100.4	73	10	17.5	0.151	7.9	230
052701	0.00	0.00	8.3	708.4	340.1	3.1	100.7	56	9	9.1	0.142	8.4	320
052801	0.00	0.00	15.4	627.7	710.3	5.9	101.7	51	1	17.4	0.129	6.4	250
052901	0.00	0.00	15.5	512.5	296.5	3.2	101.5	63	9	16.9	0.126	5.8	250
053001	0.00	0.00	13.1	487.4	647.4	5.0	101.9	44	2	14.1	0.141	5.6	320
053101	0.00	0.00	16.0	504.7	657.2	5.7	101.9	46	3	18.2	0.188	6.5	250
060101	0.00	0.00	20.6	510.2	598.9	5.2	101.3	64	5	21.4	0.090	5.6	250
060201	0.00	0.00	24.8	566.2	525.6	6.3	100.9	53	6	25.9	0.156	5.6	250
060301	0.00	0.00	19.6	374.0	251.7	2.6	101.1	77	10	20.1	0.113	3.7	250
060401	0.00	0.00	17.9	364.0	608.9	4.9	101.7	61	2	19.7	0.434	3.8	250
060501	0.00	0.00	20.2	440.1	672.0	5.2	101.7	67	2	22.1	0.219	4.7	230
060601	0.00	0.00	21.2	343.5	401.5	3.3	101.4	80	7	22.3	0.417	3.6	230
060701	0.00	0.00	20.3	429.6	659.2	4.9	101.6	66	1	21.8	0.236	5.1	90
060801	0.00	0.00	19.9	340.7	355.8	3.0	100.9	83	9	21.2	0.155	4.5	250
060901	0.00	0.00	22.5	430.0	327.0	2.9	100.8	79	10	23.3	0.157	4.4	250
061001	0.00	0.00	23.8	572.2	444.3	4.2	100.8	73	8	25.0	0.163	6.1	250
061101	0.00	0.00	23.6	242.3	591.5	4.8	101.3	73	5	25.5	0.087	3.0	110
061201	0.00	0.00	24.1	313.0	511.1	4.6	101.3	73	6	25.2	0.281	2.8	110
061301	0.00	0.00	26.8	350.8	544.3	5.3	101.3	67	5	28.3	0.142	3.8	250
061401	0.00	0.00	23.2	489.3	500.1	4.9	100.8	71	7	25.4	0.077	4.7	290
061501	0.00	0.00	15.9	610.9	414.4	4.6	101.6	49	8	16.9	0.170	6.5	0
061601	0.00	0.00	16.2	364.4	640.3	5.6	102.2	42	3	17.9	0.182	3.7	10
061701	0.00	0.00	18.0	287.0	597.3	5.2	102.1	49	3	20.1	0.438	3.2	230
061801	0.00	0.00	20.1	364.4	664.3	6.1	101.7	48	1	22.0	0.110	4.2	250
061901	0.00	0.00	21.0	452.4	694.8	6.3	101.4	52	1	22.8	0.077	4.8	230
062001	0.00	0.00	22.1	432.3	688.1	6.3	101.3	57	1	23.9	0.159	4.4	230
062101	0.00	0.00	20.0	580.4	198.9	2.2	101.1	81	10	20.1	0.140	6.3	180

062201	0.00	0.00	22.4	353.5	339.1	3.2	100.8	75	9	23.2	0.270	2.4	290
062301	0.00	0.00	23.5	307.5	588.7	5.3	101.0	67	6	25.3	0.145	4.4	200
062401	0.00	0.00	20.3	351.7	430.2	4.3	101.5	54	7	21.0	0.168	4.5	270
062501	0.00	0.00	21.1	370.8	499.4	4.6	101.6	60	8	22.6	0.105	5.0	200
062601	0.00	0.00	20.6	277.0	394.1	3.8	101.9	54	7	22.2	0.311	3.0	290
062701	0.00	0.00	16.3	310.7	301.2	1.8	101.8	93	9	16.8	0.331	3.6	50
062801	0.00	0.00	19.4	261.0	532.0	4.0	101.9	74	5	21.4	0.136	3.1	200
062901	0.00	0.00	22.1	296.6	618.1	5.4	102.0	63	2	24.4	0.202	3.9	230
063001	0.00	0.00	27.2	484.2	680.0	7.1	101.5	58	2	28.8	0.165	5.8	290
070101	0.00	0.00	26.6	378.1	577.4	5.8	101.5	60	3	27.8	0.103	4.2	250
070201	0.00	0.00	27.4	489.3	676.6	6.9	100.9	63	2	29.3	0.118	5.7	250
070301	0.00	0.00	24.2	441.9	339.7	3.7	100.6	74	9	25.3	0.244	5.2	250
070401	0.00	0.00	21.8	459.2	578.3	5.4	101.4	55	4	22.3	0.082	5.9	290
070501	0.00	0.00	21.6	362.6	437.1	4.3	101.7	59	6	23.1	0.077	4.1	290
070601	0.00	0.00	19.1	237.8	367.3	2.9	101.8	71	8	20.9	0.277	2.8	215
070701	0.00	0.00	20.5	284.3	358.6	3.4	101.6	69	9	22.4	0.143	3.7	160
070801	0.00	0.00	21.1	340.3	405.8	3.8	101.2	71	8	22.8	0.420	3.0	160
070901	0.00	0.00	21.0	465.6	572.6	5.6	101.5	53	4	22.8	0.187	4.7	340
071001	0.00	0.00	20.7	371.7	660.2	6.1	101.8	48	2	22.7	0.091	4.4	305
071101	0.00	0.00	22.3	450.1	658.0	6.4	101.9	52	1	24.7	0.305	5.1	250
071201	0.00	0.00	23.0	480.6	472.7	5.0	102.1	63	7	24.4	0.148	5.1	230
071301	0.00	0.00	21.6	350.3	326.5	2.6	101.6	85	9	22.2	0.178	3.6	70
071401	0.00	0.00	24.5	322.5	480.3	4.2	101.4	70	7	26.3	0.210	3.8	230
071501	0.00	0.00	23.0	418.6	250.6	2.1	101.5	87	10	23.4	0.130	5.0	110
071601	0.00	0.00	23.1	311.1	300.3	2.5	101.2	85	9	23.9	0.131	3.5	90
071701	0.00	0.00	24.3	355.8	509.6	4.5	101.2	72	7	26.0	0.369	4.2	250
071801	0.00	0.00	25.1	379.0	564.8	5.2	101.4	66	5	26.6	0.118	3.9	250
071901	0.00	0.00	25.6	338.9	558.1	5.2	101.3	66	5	27.2	0.164	3.7	230
072001	0.00	0.00	25.1	402.2	348.5	3.7	100.8	70	9	26.7	0.156	5.3	305
072101	0.00	0.00	26.6	299.3	565.5	5.4	101.3	62	4	29.0	0.157	3.2	250
072201	0.00	0.00	27.8	273.8	587.4	5.7	101.5	57	2	30.3	0.139	3.3	290
072301	0.00	0.00	27.2	249.2	500.8	4.8	101.5	66	6	29.4	0.209	3.4	250
072401	0.00	0.00	25.4	349.9	271.2	2.9	101.3	78	9	26.5	0.213	3.8	230
072501	0.00	0.00	26.2	312.0	501.5	4.9	101.2	68	5	28.1	0.179	4.5	250
072601	0.00	0.00	26.3	415.9	598.1	5.9	101.5	59	3	27.9	0.137	4.7	320
072701	0.00	0.00	24.9	379.0	512.5	5.2	101.8	60	4	26.8	0.384	4.9	110
072801	0.00	0.00	24.4	265.6	604.0	5.4	101.7	60	2	26.4	0.155	4.1	215
072901	0.00	0.00	23.8	318.0	330.5	3.0	101.2	77	8	24.5	0.198	3.3	110
073001	0.00	0.00	25.0	307.0	591.6	5.2	101.4	65	2	27.2	0.282	2.9	290
073101	0.00	0.00	26.3	378.6	398.7	4.0	101.3	71	7	28.0	0.241	4.4	230
080101	0.00	0.00	23.4	479.2	375.2	3.9	101.8	67	7	24.6	0.149	5.7	20
080201	0.00	0.00	20.9	320.2	288.3	3.2	101.9	63	8	22.0	0.237	3.6	160
080301	0.00	0.00	23.1	354.4	297.9	3.0	101.3	77	9	24.3	0.168	3.6	230

080401	0.00	0.00	22.7	313.9	349.2	3.5	101.5	67	8	24.1	0.114	3.2	110
080501	0.00	0.00	21.8	285.2	396.6	3.5	101.6	68	8	23.3	0.201	3.2	110
080601	0.00	0.00	23.0	328.9	405.6	3.8	101.5	66	8	24.8	0.096	3.6	140
080701	0.00	0.00	24.2	274.7	544.3	5.1	101.6	56	4	26.5	0.151	3.0	290
080801	0.00	0.00	24.6	308.4	491.7	5.0	101.6	54	4	27.4	0.139	4.0	290
080901	0.00	0.00	25.6	264.2	555.3	5.3	101.9	52	4	28.2	0.106	2.9	290
081001	0.00	0.00	26.2	372.6	464.1	4.6	102.0	69	6	27.8	0.274	4.0	230
081101	0.00	0.00	25.0	385.8	307.3	3.2	101.6	74	7	26.1	0.321	4.4	250
081201	0.00	0.00	25.4	366.3	361.0	3.9	101.3	68	9	26.6	0.138	3.5	250
081301	0.00	0.00	20.6	538.4	529.0	5.4	101.6	48	3	22.3	0.276	6.7	330
081401	0.00	0.00	18.6	341.2	609.0	5.3	102.3	46	1	21.2	0.085	3.9	320
081501	0.00	0.00	21.5	479.7	626.8	5.8	102.2	56	1	23.8	0.102	5.5	230
081601	0.00	0.00	24.2	408.2	508.9	5.6	101.8	54	3	26.4	0.077	3.7	320
081701	0.00	0.00	21.3	440.1	621.3	6.0	102.5	46	1	23.1	0.123	4.4	110
081801	0.00	0.00	20.1	259.2	613.3	5.3	102.8	46	1	23.5	0.162	3.2	110
081901	0.00	0.00	19.9	260.6	414.3	4.2	102.3	47	7	22.9	0.071	3.2	180
082001	0.00	0.00	20.1	323.9	197.6	2.0	101.6	75	10	21.7	0.105	3.2	110
082101	0.00	0.00	21.4	585.8	333.1	2.8	101.0	88	9	22.7	0.131	6.3	250
082201	0.00	0.00	22.6	320.2	349.2	3.3	101.8	72	8	24.2	0.105	3.5	250
082301	0.00	0.00	21.2	375.4	210.1	1.6	102.2	89	10	21.4	0.083	5.0	90
082401	0.00	0.00	24.0	272.0	382.9	3.3	102.3	75	7	25.5	0.114	2.2	140
082501	0.00	0.00	24.8	361.2	322.6	2.9	101.9	81	9	26.1	0.119	3.7	180
082601	0.00	0.00	24.3	418.2	297.6	2.5	101.6	84	8	25.0	0.115	4.7	230
082701	0.00	0.00	25.5	360.8	450.0	4.2	101.5	68	5	27.3	0.217	4.4	290
082801	0.00	0.00	25.5	310.2	526.7	4.6	101.5	70	2	27.4	0.168	3.2	250
082901	0.00	0.00	25.5	408.2	477.8	4.4	101.2	71	5	27.4	0.180	4.3	260
083001	0.00	0.00	22.9	374.5	562.0	5.1	101.6	61	1	24.6	0.131	3.2	0
083101	0.00	0.00	24.4	366.3	564.7	5.2	101.5	60	2	27.1	0.072	4.9	290
090101	0.00	0.00	26.1	395.9	473.3	4.6	101.5	69	3	28.0	0.301	4.2	230
090201	0.00	0.00	26.0	395.0	477.3	4.7	101.7	66	4	28.1	0.100	4.8	305
090301	0.00	0.00	24.7	297.9	457.8	4.4	101.7	68	4	27.4	0.091	3.6	320
090401	0.00	0.00	26.5	326.6	427.9	4.6	101.5	61	3	28.8	0.327	4.0	320
090501	0.00	0.00	27.9	350.3	469.2	5.2	101.4	59	2	29.6	0.161	3.7	20
090601	0.00	0.00	26.5	401.3	455.4	4.9	101.6	62	3	28.2	0.189	4.9	110
090701	0.00	0.00	24.0	399.1	305.5	3.4	102.0	67	9	24.9	0.090	4.6	110
090801	0.00	0.00	22.9	244.6	232.3	2.7	102.2	62	10	24.3	0.295	2.2	110
090901	0.00	0.00	23.8	279.7	352.1	3.6	102.0	63	6	25.3	0.159	3.1	250
091001	0.00	0.00	24.7	331.6	478.1	4.4	101.8	67	3	26.5	0.226	3.8	250
091101	0.00	0.00	25.9	379.9	464.7	4.1	101.6	76	3	27.5	0.178	4.0	250
091201	0.00	0.00	26.1	329.8	457.9	4.0	101.6	74	4	27.9	0.061	3.4	250
091301	0.00	0.00	25.7	392.2	431.5	4.2	101.5	69	2	27.7	0.315	4.0	200
091401	0.00	0.00	24.1	379.0	230.1	2.1	101.0	83	9	25.1	0.264	5.0	200
091501	0.00	0.00	18.8	605.0	275.2	3.5	101.1	61	9	18.9	0.090	6.6	340

091601	0.00	0.00	15.3	428.7	468.4	4.0	102.1	52	2	17.4	0.154	4.9	0
091701	0.00	0.00	15.8	592.2	458.3	4.3	103.0	53	2	17.6	0.078	6.5	80
091801	0.00	0.00	16.0	648.7	400.0	3.9	102.8	56	5	17.0	0.200	6.9	70
091901	0.00	0.00	18.0	636.8	228.6	2.4	102.3	78	10	18.2	0.187	6.8	70
092001	0.00	0.00	20.0	828.2	223.6	2.8	101.3	78	10	20.4	0.063	8.8	70
092101	0.00	0.00	22.2	838.2	265.4	4.3	100.7	63	8	23.3	0.062	9.6	320
092201	0.00	0.00	23.7	418.6	477.5	5.1	101.4	52	0	26.2	0.130	5.3	340
092301	0.00	0.00	23.9	245.1	438.7	4.1	101.6	56	0	27.1	0.222	3.4	340
092401	0.00	0.00	24.0	350.3	435.2	4.1	101.6	63	1	26.8	0.167	4.6	70
092501	0.00	0.00	23.5	458.7	258.7	2.8	101.0	70	8	25.9	0.163	5.4	0
092601	0.00	0.00	19.8	480.1	465.7	3.9	101.4	61	1	21.9	0.057	6.9	290
092701	0.00	0.00	16.6	225.5	318.5	2.4	102.1	61	6	18.6	0.055	1.6	0
092801	0.00	0.00	17.6	375.4	432.9	3.9	101.8	54	1	21.4	0.128	4.8	320
092901	0.00	0.00	11.4	310.2	463.8	3.0	102.5	49	0	14.2	0.100	3.7	320
093001	0.00	0.00	12.8	266.9	414.4	2.8	102.7	61	0	16.3	0.272	4.2	180
100101	0.0426	0.00	15.3	266.9	352.7	2.4	102.6	69	5	18.9	0.077	3.4	200
100201	0.0426	0.00	16.7	357.1	121.6	0.8	101.8	94	10	17.6	0.108	3.6	70
100301	0.0426	0.00	14.1	590.8	146.1	1.1	101.1	92	10	14.2	0.089	6.4	0
100401	0.0426	0.00	10.0	612.7	271.3	2.5	101.4	58	6	12.2	0.072	7.6	160
100501	0.0426	0.00	10.3	384.0	442.9	2.9	102.3	59	0	13.7	0.059	5.1	250
100601	0.0426	0.00	14.7	263.8	400.6	2.9	102.3	58	0	19.2	0.216	3.2	250
100701	0.0426	0.00	16.7	226.9	399.5	2.9	102.1	57	1	21.0	0.159	3.1	125
100801	0.0426	0.00	17.5	262.4	169.6	1.7	102.0	67	10	20.1	0.138	3.2	0
100901	0.0426	0.00	17.9	315.2	302.2	2.9	101.8	57	5	21.7	0.198	4.0	320
101001	0.0426	0.00	17.4	218.7	399.5	3.1	102.3	56	1	21.5	0.070	3.1	305
101101	0.0426	0.00	17.7	227.3	356.9	2.9	102.5	60	2	21.8	0.188	3.2	140
101201	0.0426	0.00	17.2	309.3	356.8	2.6	102.2	65	3	19.6	0.066	3.2	140
101301	0.0426	0.00	17.7	347.6	357.2	2.6	101.6	73	3	20.4	0.076	4.1	230
101401	0.0426	0.00	13.3	490.6	113.1	1.1	100.8	86	10	15.2	0.164	5.1	0
101501	0.0426	0.00	7.7	728.0	250.4	2.8	101.0	47	8	8.8	0.158	8.2	320
101601	0.0426	0.00	7.9	517.5	367.7	2.7	101.5	44	2	10.1	0.129	6.6	340
101701	0.0426	0.00	10.5	355.8	380.6	2.7	101.7	52	0	14.3	0.093	3.9	230
101801	0.0426	0.00	14.3	317.5	323.6	2.4	101.6	66	3	17.4	0.106	4.0	230
101901	0.0426	0.00	14.4	265.6	343.1	2.6	101.2	62	1	17.9	0.142	3.2	150
102001	0.0426	0.00	15.8	441.9	305.8	3.2	100.4	57	4	18.0	0.047	4.6	70
102101	0.0426	0.00	11.7	783.5	97.0	1.2	100.6	93	10	11.5	0.067	7.8	50
102201	0.0426	0.00	10.6	774.0	151.0	2.6	101.0	64	10	11.3	0.142	7.6	20
102301	0.0426	0.00	7.6	506.6	348.9	2.4	101.8	58	0	9.3	0.068	6.5	50
102401	0.0426	0.00	7.8	295.2	324.6	1.8	101.9	64	1	10.7	0.107	3.3	305
102501	0.0426	0.00	11.7	220.9	338.2	1.9	101.7	76	1	14.9	0.052	3.1	200
102601	0.0426	0.00	11.3	529.8	211.3	2.4	101.6	50	7	12.4	0.153	6.7	290
102701	0.0426	0.00	7.3	457.8	304.9	2.1	102.4	57	2	10.6	0.086	6.4	320
102801	0.0426	0.00	6.9	297.5	311.5	2.0	102.8	61	3	9.7	0.082	4.5	230

102901	0.0426	0.00	11.9	410.0	326.0	2.6	102.4	55	0	14.6	0.089	4.4	250
103001	0.0426	0.00	15.6	535.7	191.2	2.3	101.2	64	8	17.8	0.067	5.9	250
103101	0.0426	0.00	16.5	472.9	253.9	3.0	100.3	60	5	19.9	0.108	7.0	270
110101	0.1549	0.00	11.6	503.8	254.5	3.1	100.4	46	4	14.9	0.117	5.8	290
110201	0.1549	0.00	9.8	399.5	231.6	2.1	102.3	54	5	11.8	0.136	4.1	125
110301	0.1549	0.00	17.6	439.1	205.8	2.1	102.4	73	6	20.0	0.115	6.4	180
110401	0.1549	0.00	19.6	458.7	161.7	1.7	102.3	79	9	21.5	0.110	4.8	200
110501	0.1549	0.00	19.5	354.4	207.7	1.9	102.2	74	6	22.4	0.043	4.4	200
110601	0.1549	0.00	15.1	298.8	126.7	0.9	102.1	87	10	16.9	0.079	3.2	320
110701	0.1549	0.00	9.8	453.7	261.6	1.8	101.6	62	4	12.1	0.052	6.0	320
110801	0.1549	0.00	5.1	480.6	221.3	1.9	101.1	53	5	7.6	0.072	5.0	320
110901	0.1549	0.00	2.3	646.9	155.0	1.6	100.9	54	7	4.2	0.048	7.8	290
111001	0.1549	0.00	0.9	472.9	251.6	1.6	101.5	48	2	3.2	0.123	6.9	340
111101	0.1549	0.00	2.0	250.1	290.3	1.4	102.3	51	0	4.1	0.060	3.3	230
111201	0.1549	0.00	9.2	212.3	205.8	1.3	102.5	70	5	11.4	0.083	3.3	190
111301	0.1549	0.00	13.4	280.6	138.1	0.9	102.7	85	10	14.5	0.060	3.1	230
111401	0.1549	0.00	14.7	418.6	89.4	0.6	102.0	94	10	15.1	0.060	5.1	230
111501	0.1549	0.00	10.7	330.3	203.6	1.3	102.3	66	4	12.3	0.101	3.6	20
111601	0.1549	0.00	8.9	361.7	152.7	0.7	101.8	87	9	9.5	0.045	3.5	110
111701	0.1549	0.00	10.1	568.1	171.7	1.7	101.1	59	6	11.7	0.140	7.6	320
111801	0.1549	0.00	3.2	544.8	239.0	1.8	101.7	49	2	5.4	0.048	7.4	320
111901	0.1549	0.00	1.2	256.5	119.3	1.0	102.1	54	8	1.5	0.117	2.9	320
112001	0.1549	0.00	1.4	461.5	96.7	0.5	101.8	91	10	2.1	0.098	5.4	10
112101	0.1549	0.00	2.3	571.7	120.9	1.3	102.0	64	9	4.3	0.186	6.7	320
112201	0.1549	0.00	3.1	311.6	174.0	1.1	102.1	60	5	4.6	0.118	3.5	320
112301	0.1549	0.00	6.6	369.4	180.4	1.3	101.7	63	6	8.7	0.034	3.5	160
112401	0.1549	0.00	9.4	793.6	109.3	1.5	100.4	78	10	10.4	0.046	9.1	320
112501	0.1549	0.00	7.2	594.5	230.4	2.7	102.5	41	0	9.2	0.130	7.4	0
112601	0.1549	0.00	6.7	236.4	194.8	1.6	102.4	34	5	10.9	0.052	3.1	0
112701	0.1549	0.00	5.2	440.1	100.3	1.2	101.0	69	10	8.0	0.096	2.9	250
112801	0.1549	0.00	0.3	806.8	235.7	2.1	101.0	39	1	1.3	0.052	8.8	320
112901	0.1549	0.00	0.9	674.2	226.0	2.1	101.1	36	0	3.2	0.125	8.2	320
113001	0.1549	0.00	2.4	515.7	187.1	1.5	102.2	54	4	5.8	0.132	7.3	290
120101	0.2122	0.00	3.4	294.3	190.5	1.1	102.6	58	3	6.4	0.051	4.1	290
120201	0.2122	0.00	3.2	265.6	111.7	0.9	102.1	71	7	6.5	0.130	4.7	320
120301	0.2122	0.00	4.9	289.3	214.7	1.4	102.6	50	3	8.8	0.059	4.8	0
120401	0.2122	0.00	3.5	348.5	117.5	0.8	102.3	79	8	5.3	0.051	5.2	180
120501	0.2122	0.00	7.7	748.9	174.7	2.2	100.5	47	4	10.2	0.093	10.6	290
120601	0.2122	0.00	0.8	410.9	233.1	1.4	101.2	45	0	3.7	0.037	5.0	290
120701	0.2122	0.00	2.0	706.5	169.0	1.9	100.7	41	4	5.2	0.032	9.4	290
120801	0.2122	0.00	-1.9	738.9	192.2	1.7	101.9	41	2	0.1	0.146	9.0	320
120901	0.2122	0.00	-3.0	315.2	100.6	0.7	103.1	55	10	-1.6	0.059	3.0	320
121001	0.2122	0.00	-0.8	283.3	86.6	0.3	102.3	97	10	-0.3	0.054	2.5	10

121101	0.2122	0.00	3.0	303.4	163.9	0.9	102.5	72	6	4.7	0.038	3.8	330
121201	0.2122	0.00	4.6	454.6	67.5	0.2	101.2	96	10	5.6	0.032	5.1	70
121301	0.2122	0.00	0.5	632.7	203.4	1.2	101.7	51	3	0.6	0.048	8.3	320
121401	0.2122	0.00	-2.8	482.0	135.3	1.2	102.7	48	6	-1.7	0.067	5.2	250
121501	0.2122	0.00	-3.0	680.6	197.9	1.7	103.1	33	2	-2.0	0.061	7.6	340
121601	0.2122	0.00	-5.8	268.8	135.2	0.7	103.2	48	5	-5.0	0.096	2.2	190
121701	0.2122	0.00	0.2	395.0	74.1	0.2	101.3	100	10	0.4	0.056	4.6	70
121801	0.2122	0.00	2.4	452.4	74.9	0.3	100.1	97	10	2.7	0.095	4.8	0
121901	0.2122	0.00	3.6	306.1	58.8	0.2	100.9	100	10	3.7	0.138	3.3	70
122001	0.2122	0.00	3.5	594.5	134.7	1.0	101.1	75	7	5.1	0.057	7.3	320
122101	0.2122	0.00	0.6	573.5	145.8	1.3	101.7	56	7	2.1	0.034	6.7	320
122201	0.2122	0.00	-1.4	429.6	140.2	1.0	101.9	53	5	0.6	0.035	5.9	320
122301	0.2122	0.00	-2.7	305.2	116.2	0.4	101.7	69	9	-1.0	0.028	1.7	0
122401	0.2122	0.00	-1.9	774.0	108.3	0.4	99.8	95	10	-1.5	0.033	7.4	25
122501	0.2122	0.00	-2.9	678.8	185.9	1.0	101.2	66	2	-1.2	0.124	7.3	320
122601	0.2122	0.00	-2.6	474.2	189.0	0.8	101.6	66	4	-0.9	0.061	5.3	250
122701	0.2122	0.00	0.2	190.4	208.3	0.7	100.9	73	2	2.5	0.036	3.2	190
122801	0.2122	0.00	-0.5	422.3	81.8	0.3	99.8	92	10	-0.4	0.044	5.2	160
122901	0.2122	0.00	-6.6	406.8	191.4	0.7	101.2	56	3	-5.2	0.038	5.4	290
123001	0.2122	0.00	-6.9	432.8	190.2	0.7	101.9	55	1	-5.2	0.106	6.8	290
123101	0.2122	0.00	-3.9	315.2	221.2	0.8	102.5	63	0	-2.1	0.044	3.6	230

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PRZM3 VINYL CHLORIDE Simulation, JUNE 2006
"WILLIAM DICK LAGOONS; Metfile: W13739A.txt"
    0.00     0.50        0   00.00        0        1
       0
       1
       1     0.02   00.00   99.00        1  81   75   75     0.00    12.00
       1
  15 401  251001  261001        1
Chemical Input Data:
       1        1        0        0
Vinyl Chloride
   1 101  0 4305.0  36.6 1.00 .000
      0.        2   0.00
Soil Horizon 1 Silt Loam
  305.00           0    0    0    0    1    0    0    0    0
    0.00     0.00    5.00
       1
       1  305.00   1.200   0.288   0.000   1.310   0.000
         0.00038 0.00000 0.00000
            5.00   0.288   0.148   1.950  0.0479
       0       0
    WATR    YEAR      61    PEST    YEAR      61    CONC    YEAR      61  .0
       1    YEAR
    INFL1   TSER   0    0     1.0       P        1
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*********************VADFOT FLOW***********************
VADOSE ZONE VINYL CHLORIDE Simulation, JUNE 2006
   98    1    1    1    1    1    1    1    0    0
   50    2    5     0.100
    1    1    1    1    0    1    2    1    0
      0.0        1.0        1.0        1.0
    1       0.0        1.0
    2
    1   90    1     914.40
    2    7    1     213.40
      0.0    0
    0    1       0.0        0.0    0    0        0.0        0.0
     712.0      0.30        0.0        0.0
     0.055     -1.00      0.124      2.280      0.561
    5   45
YEAR
********************VADFOT TRANSPORT**********************
VADOSE ZONE VINYL CHLORIDE TRANSPORT Simulation, JUNE 2006
   98    1    1    1    0    1    1    0    0    0
    0    1    1    0    0    1    2    0
      0.0        1.0        1.0        1.0
    1       0.0        1.0
    2
    1   90    1     914.40
    2    7    1     213.40
      0.0    0
    0    0       0.0        0.0    0    0        0.0        0.0
      30.5      0.30
  1.00085       0.0
    1  1.000e-9       1.00       0.0
    1  0.380E-3  0.000E00
    1    1
    5   45
YEAR
```

ATTACHMENT 2

Bernice Pasquini/R3/USEPA/US
09/28/2006 10:31 AM

To Pat Mcmanus/R3/USEPA/US@EPA
cc Dawn Ioven/R3/USEPA/US@EPA, Kathy Davies/R3/USEPA/US@EPA
bcc
Subject Calculation of Vinyl Chloride Cleanup Level in Soil for the William Dick Lagoons Superfund Site Operable Unit No. 3

I have reviewed, the submittal prepared by Shaw Environmental, and it appears that the analysis performed is accurate and acceptable. The cleanup calculated clean up goal for vinyl chloride of 15 ug/Kg (ppb) should be protective of the ground water and prevent its degradation above the state MCL of 1 ug/L.

Thank you for the opportunity for reviewing the subject document. If you have any questions, feel free to stop by my office.

"The future belongs to those who believe in the beauty of their dreams."

Eleanor Roosevelt

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ATTACHMENT 3

Dawn Ioven/R3/USEPA/US	To	Pat Mcmanus/R3/USEPA/US@EPA
08/29/2006 12:50 PM	cc	
	bcc	
	Subject	Soil-to-GW Calculation for Vinyl Chloride - William Dick Lagoons

Hi, Pat. I reviewed the report entitled, Calculation of Vinyl Chloride Clean-Up Level in Soil, for the William Dick Lagoons site. In this report, calculations were performed to determine an acceptable concentration of vinyl chloride in soil, such that the MCL for this compound would not be exceeded following migration from soil to gw. Although fate-and transport modeling is not my area of expertise, I will offer my opinion on the concentration proposed in the report as being protective of gw.

Based on modeling, the report suggests that a vinyl chloride level of 15 ug/kg in soil would not adversely impact gw at the site. As points of reference, the generic SSLs for vinyl chloride at respective DAFs of 1 and 20 are 0.7 ug/kg and 10 ug/kg. Typically, these generic SSL values are very conservative, often reflecting worst-case conditions at a site. However, since the vinyl chloride clean-up concentration proposed in the report (15 ug/kg) slightly exceeds the generic value at the most lenient end of the SSL range (10 ug/kg), I suggest that the hydro assigned to this site review the report to ensure that the site-specific model inputs are justifiable.

If you have any questions, Pat, please let me know. Thanks.

Dawn A. Ioven, toxicologist
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