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16 December 2005

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Mr. Alexander MacDonald
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Mr. Ed Cargile
National Priority List Unit
Northern California-Central Cleanup
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Site Mitigation Program
Department of Toxic Substances
Control
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SUBJECT: Response to Agency Comments on Aerojet's Preliminary Response to Agency Comments, February 2005 Final Perimeter Groundwater Operable Unit Remedial Investigation/Feasibility Study

Dear Mr. Berrey, Mr. MacDonald and Mr. Cargile:

Aerojet has reviewed the 24 October 2005 Agencies' comments on Aerojet's August 2, 2005 "Preliminary Response to Agency Comments, February 2005 Final Perimeter Groundwater Operable Unit Remedial Investigation/Feasibility Study (RI/FS)". The following responses are provided to the Agency comments:

Agency General Comments

Original Comment 2. The California Public Health Goals (PHGs) are listed as a "to be considered" Applicable or Relevant and Appropriate Requirement (ARAR). The discharge limit for the Groundwater Extraction and Treatment Systems (GETs) will need to comply with the substantive requirements of the RWQCB's National Pollution Discharge Permit (NPDES) which is an applicable ARAR. Aerojet's current NPDES discharge limit for trichloroethylene is 0.5 µg/L.

In addition, Pursuant to Title 27 the State will not certify closure of the waste management units in Zone 4 until it is demonstrated that capture of the pollutants with concentrations exceeding Water Quality Objectives is taking place. The Water Quality Objective for TCE is 0.8 µg/L.

Response Comment noted.

Original Comment 20. A main purpose of Figure A-2 is to show the spatial extent of dredged areas. The figure should be updated to show dredged areas in the western portion of Zone 1 even though development has occurred.

Response Aerojet will update Figure A-2 to show the dredged areas in the western portion of Zone 1 and provide it with the Final PGOU RI/FS risk assessments.

Original Comment 23. As requested in the original comment #15 from Appendix J, the report should provide a list of wells and water level data that were not used to prepare the potentiometric surface maps.

Response A list of wells and water level data not used to prepare the potentiometric surface maps is provided as an attachment to this response to comments document.

Specific Comments

Original Comment 8. The purpose of the RI is to present site specific information that was gathered during the investigation. The Agencies maintain their position that this paragraph needs to be removed from the document.

Response Aerojet understands the Agency position but respectfully disagrees.

Original Comment 75. The point of the comment was to indicate that 3 samples are inadequate to characterize potential concentrations in soil gas within the PGOU zones. This data would not be sufficient for a Tier 3 evaluation. Based on the 22 September 2005 meeting with Aerojet, the Agencies understand that the results of Johnson and Ettinger (J&E) model validation study will be used to evaluate this pathway.

Response Your understanding is correct.

Original Comment 101. In accordance with EPA Risk Assessment Guidance for Superfund (RAGS) Part A (Section 5.3), Aerojet needs to provide an evaluation of the adequacy of laboratory reporting limits for all of the chemicals assessed at the site. This can be done by including chemicals that were not positively detected in any samples in the data summary tables, or in a separate analysis. Just stating that the most sensitive analytical methods were used is not sufficient. Evaluate whether chemicals not positively detected in the sampled media need to be included as Chemicals of Potential Concern (COPC) due to high reporting limits.

Response Summary tables presenting an evaluation of the adequacy of the laboratory limits for chemicals in groundwater will be included in the revised risk assessments.

Original Comment 103. Response to this comment is inadequate as Aerojet only responded to the first paragraph of Comment 103. Please respond to all of the paragraphs presented in Comment 103.

Response The original comment 103 is repeated below with the responses following.

Part 1, Vol. 4, Appendix E, Tables 9.1 and 9.2. The date for both RfD and target organ information should be entered as the date of the IRIS data was searched. Please revise to be consistent with this requirement in RAGS D.

Response Tables 9.1 and 9.2 will be revised to include date of the IRIS search.

In Table 9.1, please provide the RfC for all chemicals with a listed inhalation RfD.

Response As agreed in 26 May 2005 meeting, only published RfCs from readily available USEPA (e.g., IRIS) and California EPA toxicity databases will be included in Table 9.1. In cases where published RfCs are not available, RfCs will not be calculated from published RfDs.

In Tables 9.1 and 9.2, chemicals without noncancer toxicity values should be indicated with an NTV rather than a dash. NTV stands for "No Toxicity Value Available".

Response Tables 9.1 through and 10.2 were revised based on 28 October 2003 agencies comments on the Draft BLRA. Therefore, no changes will be made to reflect this comment.

In Table 9.2, the inhalation RfC for Tetrachloroethylene is 0.035 mg/m³ (source: Cal EPA). The converts to an inhalation RfD of 0.01 mg/kg-day as presented in the EPA 9 PRG table. An RfD of 0.1 is listed for tetrachloroethylene in Table 9.2. Please change this to 0.01.

Response Table 9.2 will be revised to reflect this comment.

In Table 9.2, the inhalation RfD for TCE should be 0.01 mg/kg-day as recommended in the EPA Region 9 PRG table. This is an NCEA value. Please use the EPA NCEA recommended value because it is more conservative than the Cal EPA value.

Response As agreed upon during resolution of the Draft BLRA comments, the risks to TCE will be calculated using the California Modified slope factors and reference doses. In addition, for TCE, the risks calculated using the USEPA slope factors and reference doses will be evaluated in the uncertainty section.

Original Comment 105. The last response "See previous response to Specific Comment 103" does not resolve the last comment associated with the comments provided in 105. Please specifically respond to the last part of Comment 105.

Response Tables 9.1 through and 10.2 were revised based on 28 October 2003 agencies comments on the Draft BLRA. Therefore, no changes will be made to reflect this comment.

Original Comment 110 and 111. Replacement pages need to be provided to correct the column heading as requested in the comment.

Response Aerojet agrees to provide replacement pages with the Final PGOU RI/FS risk assessments.

Original Comment 138. The extent of contamination in both Areas 39 and 41 need to be shown on the site wide composite plume map provided by Aerojet for the 17 May 2005 Community Advisory Group meeting. Also the legend needs to be revised so all of Area 39 is shown. The extent of contamination needs to be clearly identified (i.e., red line instead of light green hatch).

Response Aerojet proposes to discuss edits to the site-wide composite plume map with the Agencies at the next, regularly scheduled technical meeting. It is not certain that current, representative groundwater data exists to map the extent of contamination in both Areas 39 and 41; and it may be more appropriate to provide the updates requested by the Agencies after completion of the RI in those areas.

Original Comment 141. The agencies recognize Layer B in this area is not a prolific aquifer. Groundwater monitoring (water levels and analytical data) will be needed to confirm containment of Layer B concentrations.

Response Aerojet agrees with this comment.

Original Comment 143. As shown on Figures H3-2 and H3-3 (Appendix H, Part 1, Vol. 5) groundwater modeling indicates that the COC plume within and upgradient of the northwest portion of PGOU Zone 2 is captured by GET E/F extraction wells. Per page 4 the OU3 Statement of Work (SOW) Section III(B), the Agencies expect the first GET E/F effectiveness evaluation to address the interaction of these remedies and the containment of groundwater at or above the cleanup level. Aerojet needs to acknowledge this requirement.

Response Aerojet acknowledges the OU3 Statement of Work establishes this requirement.

Original Comment 149. In general, increasing the effective porosity will decrease the extent of hydraulic capture for a given extraction rate. In the design phase, Aerojet needs to justify values used in the groundwater model. Sensitivity analyses are also needed to document how the range of values will affect the model results.

Response Comment noted.

Original Comment 150. The hydraulic conductivities used in the model need to be consistent with those derived from aquifer tests conducted near the extraction wells. These inconsistencies need to be resolved during refinement of the model for the design phase.

Response Aerojet agrees.

Original Comment 153. The outcome of the discussion on this comment at the 22 September 2005 meeting needs to be documented.

Response Aerojet has agreed to evaluate the potential impacts of VOCs and non-VOCs in groundwater on a site-specific basis using VLEACH to provide for consistency with the RB review. Aerojet will also conduct additional discussion with the Agencies to confirm agreement with the parameters to be used in the VLEACH model.

Original Comment 155. Aerojet asserts that there were no quality issues associated with the leachate data. Please explain why the "laboratory detection limits" for the analyzed constituents are well-above those that are generally accepted for analysis of aqueous samples.

Response Level III review of the data did not identify any quality issues (i.e, dilution, instrument calibration problems, matrix interference) related to the laboratory analysis of the samples and no quality issues were noted by the laboratory in the case narrative. Although the detection limits were elevated, none of the data (either detects or non-detects) were qualified or rejected based on the results of the validation and therefore the data could be used for decision making purposes.

Because the primary concern related to the analysis of the extract was the potential leachability of lead, Aerojet agreed at the 22 September 2005 meeting to collect soil samples at 2, 5, and 10 feet bgs at two locations (SNS07 and SNS10) within the Site 10D ditch for lead.

Original Comment 156. If the chlorinated benzene compounds (1,2-dichlorobenzene and 1,2,4-trichlorobenzene) are present in the ditch samples at concentrations of concern, leachability tests need to be performed for these two analytes. Their solubility and soil sorption characteristics indicate that they are likely to exhibit constituent leaching at significant concentrations. In addition, not just soluble concentrations present threats to water quality. Total concentrations can be mobilized and transported via surface water to potential receptors.

Response Aerojet has agreed to provide the analytical results for surface water and soil samples collected at sampling station S-2 in the revised risk assessments and fate and transport section (Section 6) of Part 2 of the PGOU RI/FS. However, the agencies should note that sampling station S-2 is located within a section of ditch identified as potential source site 12D, which is not within the PGOU. The ditch at Site 12D, along with all other ditches within the Administration Area not addressed in the PGOU, are currently being investigated as part of the Boundary Operable Unit. Aerojet understands that because the Site 12D ditch is located at the confluence of numerous ditches within the Administration Area, chemicals in surface water and soil at that location may have originated from an upstream source which needs to be identified. The results of the PGOU RI should therefore confirm, to the extent possible, that contaminants identified at Site 12D did not originate from those sections of ditch (Sites 5D, 7D, 10D, and 11D) included in the PGOU. With respect to 1,2-dichlorobenzene and 1,2,4-trichlorobenzene, those compounds were not detected (<10 µg/L) in surface water samples collected at Station S-2 in 2002 and 2003, nor were they detected in soil vapor samples collected adjacent to the sections of ditch (Sites 5D, 7D, 10D, and 11D) included in the PGOU.

Original Comment 163. Aerojet asserts that arsenic and aluminum concentrations are correlated with one another, and that this correlation is represented by the concentration plot in section "Response to Specific Comment 163". The statistical analyses are inadequate to support this assertion, and the regression technique is not appropriate to determine correlation. Regression analysis requires the residuals to be normal. The variance of the residuals should also be constant (e.g., so that when the residuals are plotted versus X or Y, the degree of scatter is relatively uniform). However, plots of the residuals were not included. Residual plots need to be included when regression analysis is performed.

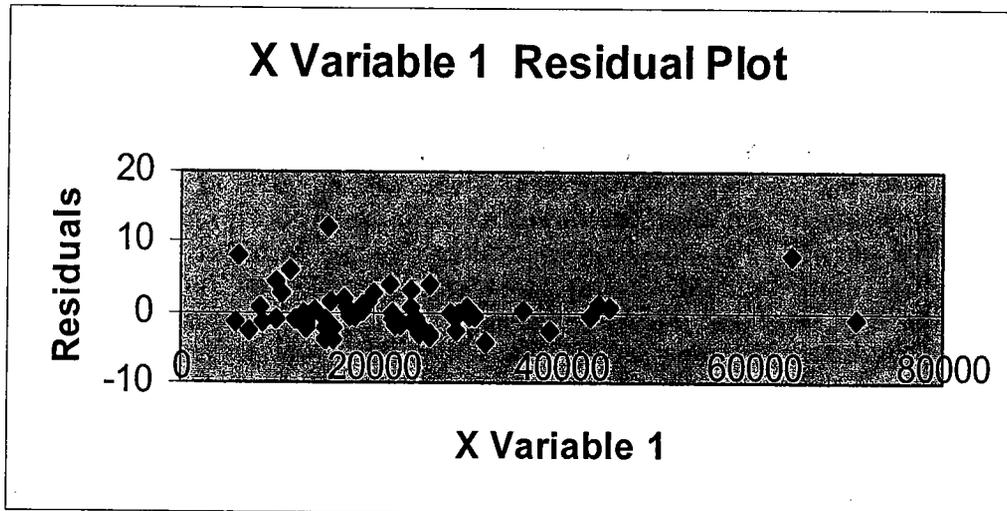
Data are not sufficient to support the assumption that all chromium is present in the trivalent form. Considering the differences in risk associated with exposure to trivalent versus hexavalent chromium, hexavalent chromium analysis needs to be performed on each sample. Aerojet needs to provide additional information that presents the frequency of detection of hexavalent chrome at similar sample locations within the PGOU to make the case that trivalent chromium PRG should be selected.

Response Aerojet presents the following information to support the assertion that arsenic and chromium are not contaminants of concern within the PGOU:

The statistical analysis was just one aspect of the overall evaluation of arsenic. In the response to the original comment, Aerojet demonstrated that only two relatively high arsenic levels were identified as "far outliers" in the overall PGOU dataset, and these values could not be verified as representing elevated arsenic conditions at the site. In one case, repeat sampling at the same

location failed to confirm the elevated arsenic. In the second case, the sample was identified as an outlier based on an elevated detection limit and evaluation of sample data from the same location at shallower depths failed to confirm the presence of elevated arsenic.

The samples with positive detections of arsenic show an overall correlation with aluminum levels, as would be expected from the natural association of this metal with aluminum in clay minerals. A residual plot is provided as follows:



The residuals generally deviate from a normal distribution, as can be seen by several of the samples with higher than expected arsenic at both the low and high end of the aluminum range. However, the data are still highly correlated based on a nonparametric Spearman Rank Correlation test. Therefore, the statistical analysis confirms that arsenic is correlated with aluminum and the few elevated detections at the site represent natural substrate variation rather than contamination.

With regard to chromium, the comment seems to incorrectly state that hexavalent chromium data are insufficient to evaluate risk. Hexavalent chromium data were collected concurrently with total chromium not only for the single sample from Site C15 that exceeds the total chromium PRG, but for all RI samples collected in 2003. Out of 34 samples collected at various locations and depths, hexavalent chromium was only detected above the PQL in five samples, with a maximum concentration of 1.1 mg/kg in a sample from Site C4. The maximum concentration of hexavalent chromium is well below the residential PRG of 30 mg/kg. Additionally, hexavalent chromium was not detected in any of the four samples collected at Site C15 in 2003, including the single sample containing chromium above the total chromium PRG. The maximum percentage of hexavalent chromium in any soil sample is 2.1% which was in the sample collected at Site C4 having the maximum hexavalent chromium concentration. This is well below the 1:6 ratio of hexavalent to trivalent chromium assumed for the derivation of the total chromium PRG. Therefore, Aerojet asserts that the data are sufficient to show that hexavalent chromium does not pose a risk in soil at sites within the PGOU. Additionally, Aerojet believes that it would be inappropriate to compare total chromium concentrations to the total chromium PRG since the data indicates that 97.9% or more of the total concentration of chromium is trivalent chromium, not the 1:6 ratio of hexavalent to trivalent chromium assumed for the PRG.

Original Comment 167 part D. An evaluation of non-metal data associated with the drainage ditch needs to be conducted based on direct contact exposure. Analytical data collected from the ditch should be carried through the risk assessment process.

Response As discussed under Original Comment 156, sampling station S-2 is located along a section of ditch identified as potential source site 12D, which is not included in the PGOU. Investigation of the ditch at Site 12D is currently being conducted as part of the Boundary OU, and the data will be screened and carried through the risk assessment process in accordance with the Source Area Operable Unit Workplan.

Original Comment 175. The response indicating "See earlier response to Specific Comment 164" should actually say "See earlier response to Specific Comment 165".

Response Aerojet agrees.

Original Comment 177. It is assumed from this response that the risks will be discussed in the uncertainty section rather than in Appendix N.

Response As noted in Response to Specific Comment 92, the risks calculated using the USEPA slope factor will be evaluated and discussed in the uncertainty section.

Original Comment 181. The process for a deletion can only be initiated based on no need for further action at the time of deletion not an action to occur in the future.

Response According to EPA's stated Land Use policy (OSWER Directive No. 9355.7-04), reasonably anticipated future land use is "an important consideration in determining the appropriate extent of remediation. Future use of the land will affect the types of exposures and the frequency of exposures that may occur to any residual contamination remaining on the site, which in turn affects the nature of the remedy chosen."

The purpose of the SLERA is to identify the need for further evaluation or action based on potential exposure under current and future conditions. Under current conditions, the ditches referenced in EPA's original comment (Sites 10D and 11D) do not present a complete exposure pathway to wildlife due to lack of viable habitat. The potential for migration of constituents to areas where exposure could occur in the future, if any, will be effectively controlled by future grading and covering of the ditches. Therefore, consistent with EPA's Land Use Directive, no further action is required to address ecological risk for these ditches.

Original Comment 182. The outcome of the discussion on this comment at the 22 September 2005 meeting needs to be documented.

Response Aerojet agreed with the agencies at the 22 September 2005 meeting that an ecological risk assessment should be conducted for areas containing habitat that may be set aside for future use by wildlife. Therefore, further ecological risk assessment will be performed to address both current and future potential risks for such areas. Specifically, the additional ecological risk assessment will be performed for potential source site C15, an area noted in the SLERA to contain small patches of several habitat types. Potential ecological risks for potential source site

C15 will be further evaluated for constituents that exceed screening levels for wildlife, plants, or invertebrates, incorporating site-specific assumptions to the extent possible with available data.

Original Comment 185. The response to this comment was "so noted." Were changes made to the document to address this comment?

Response The RAOs for soil and soil vapor will be revisited upon completion of the PGOU Lands Risk Assessment. Media-specific RAOs will be developed that specify the constituents of concern, exposure pathways, and remedial goals. The remedial goals will be based on the protection of human health, groundwater, and surface water. The RAOs will address all soil sites within the PGOU.

Original Comment 186. During the 22 September 2005 meeting, Aerojet agreed that the FS would evaluate a commercial scenario because of the Agencies' concern that the size of Area 49-1 is wider than a typical roadway. Aerojet stated that additional sampling will be conducted during the design phase to confirm the size of the SVE system.

Response Aerojet agreed to include a commercial use scenario within the FS for Area 41-1. Aerojet also agrees that additional sampling would be conducted during the design of the SVE system.

Original Comment 191. The process for a deletion can only be initiated based on no need for further action at the time of deletion not an action to occur in the future.

Response See earlier response to Comment 181.

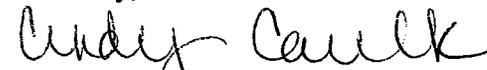
New Specific Comments

Table 6-1. This table was provided as a replacement page but no changes are evident?

Response The replacement page was provided because it was thought that the estimated length of new piping had changed due to modifications to the Z1-3 alternative. Aerojet was incorrect. Table 6-1 is unchanged. We apologize for the confusion.

Should you have any questions on this correspondence, please contact me at (916) 355-2601.

Sincerely,



Cindy L. Caulk
Program Coordinator

Attachment

cc: Paul Schubert, GSWC
Tom Gray, FOWD
Troy Day, CalAm
Steve Nugent, Carmichael Water District

Jean Young, Sacramento County Department of Water Resources
Leo Winternitz, Water Forum
Ed Winkler, Sacramento Groundwater Authority
Rob Roscoe, SSWD
Janis Heple, CAG
Bruce Lewis

**Water Level Data Not Used to Prepare PGOU RI/FS Potentiometric Surface Maps
Zone 1
Perimeter Groundwater Operable Unit (OU-5)**

Potentiometric Surface Map			Well Number	Sample Date	Measurement (ft, msl)
Figure	Layer	Date			
A-13	B	April 2004	4180	04/27/04	96.61
A-13	B	April 2004	4190	04/27/04	95.43
A-14	C	October 2003	1556	10/28/03	10.5
A-14	C	October 2003	1481	10/27/03	62.4
A-14	C	October 2003	263	10/28/03	138.7
A-14	C	October 2003	3406	10/29/03	71.2
A-15	C	April 2004	4001	04/27/04	85.8
A-15	C	April 2004	4035	04/27/04	82.4
A-15	C	April 2004	4180	04/27/04	96.6
A-15	C	April 2004	4190	04/27/04	95.4
A-15	C	April 2004	4300	04/15/04	34.9
A-15	C	April 2004	4301	04/15/04	-0.5
A-15	C	April 2004	4530	04/20/04	30.2
A-15	C	April 2004	1556	04/12/04	10.6
A-15	C	April 2004	1481	04/13/04	65.3
A-15	C	April 2004	3406	04/15/04	60.0
A-17	D	April 2004	4302	04/15/04	15.39
A-19	E	April 2004	196	04/13/04	126.67
A-19	E	April 2004	197	04/13/04	130.73

**Water Level Data Not Used to Prepare PGOU RI/FS Potentiometric Surface Maps
Zone 2
Perimeter Groundwater Operable Unit (OU-5)**

Potentiometric Surface Map			Well Number	Sample Date	Measurement (ft, msl)
Figure	Layer	Date			
B-6	A	October 2003	10	10/28/03	124.26
B-6	A	October 2003	29	10/28/03	137.97
B-6	A	October 2003	423	10/28/03	154.37
B-6	A	October 2003	3469	10/27/03	160.89
B-7	A	April 2004	4007	04/20/04	76.02
B-7	A	April 2004	10	04/14/04	117.35
B-7	A	April 2004	29	04/12/04	136.99
B-7	A	April 2004	423	04/12/04	161.14
B-7	A	April 2004	3469	04/14/04	164.45
B-8	B	October 2003	1028	10/28/03	104.93
B-8	B	October 2003	3077	10/27/03	136.5
B-9	B	April 2004	3077	04/13/04	135.04
B-10	C	October 2003	3060	10/28/03	40.29
B-10	C	October 2003	3605	10/29/03	33.98
B-11	C	April 2004	356	04/12/04	-29.94
B-11	C	April 2004	3605	04/15/04	35.06
B-11	C	April 2004	WRD1-WS	04/16/04	183.81

Water Level Data Not Used to Prepare PGOU RI/FS Potentiometric Surface Maps
 Zone 3
 Perimeter Groundwater Operable Unit (OU-5)

Potentiometric Surface Map			Well Number	Sample Date	Measurement (ft, msl)
Figure	Layer	Date			
C-19	C	October 2003	30165	10/27/03	152.56
C-20	C	April 2004	4011	04/22/04	195.22
C-20	C	April 2004	4080	04/22/04	158.84
C-20	C	April 2004	4085	04/22/04	164.87
C-20	C	April 2004	4095	04/22/04	161.47
C-20	C	April 2004	4195	04/22/04	162.71
C-20	C	April 2004	4215	04/22/04	157.5
C-20	C	April 2004	4303	04/22/04	154
C-20	C	April 2004	4565	04/22/04	127.96
C-20	C	April 2004	4570	04/22/04	126.5
C-20	C	April 2004	4575	04/22/04	128.54
C-22	D	April 2004	4080	04/22/04	158.84
C-22	D	April 2004	4085	04/22/04	164.87
C-22	D	April 2004	4095	04/22/04	161.47
C-22	D	April 2004	4195	04/22/04	162.71
C-22	D	April 2004	4215	04/22/04	157.5
C-22	D	April 2004	4303	04/22/04	154
C-22	D	April 2004	4565	04/22/04	127.96
C-22	D	April 2004	4570	04/22/04	126.5
C-22	D	April 2004	4575	04/22/04	128.54

**Water Level Data Not Used to Prepare PGOU RI/FS Potentiometric Surface Maps
 Zone 4
 Perimeter Groundwater Operable Unit (OU-5)**

Potentiometric Surface Map			Well Number	Sample Date	Measurement (ft, msl)
Figure	Layer	Date			
D-11	A	April 2004	4012	04/07/04	228.42
D-11	A	April 2004	4013	04/07/04	216.57
D-12	B	October 2003	93	10/27/03	241.33
D-12	B	October 2003	300	10/29/03	201.99
D-12	B	October 2003	3006	10/28/03	183.13
D-12	B	October 2003	3038	10/29/03	200.61
D-12	B	October 2003	3040	10/29/03	198.96
D-12	B	October 2003	3042	10/29/03	198.29
D-13	B	April 2004	93	04/14/04	241.43
D-13	B	April 2004	300	04/12/04	204.21
D-13	B	April 2004	3006	04/12/04	182.65
D-13	B	April 2004	3038	04/12/04	202.62
D-13	B	April 2004	3040	04/12/04	201.02
D-13	B	April 2004	3042	04/12/04	199.85
D-13	B	April 2004	3042	04/14/04	117.45
D-13	B	April 2004	3450	04/12/04	215.77