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Generalised collisional-radiative model for light elements. A: Data for the Li isonuclear sequence

S.D. Loch [a,*], J. Colgan [a], M.C. Witthoeft [a], M.S. Pindzola [a], C.P. Ballance [b], D.M. Mitnik [b], D.C. Griffin [b], M.G. O'Mullane [c], N.R. Badnell [c], H.P. Summers [c]

[a] *Department of Physics, Auburn University, Auburn, AL 36849, USA*
[b] *Department of Physics, Rollins College, Winter Park, FL 32789, USA*
[c] *Department of Physics, University of Strathclyde, Glasgow G40NG, UK*

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Abstract

A first stage collision database is assembled which contains electron-impact effective collision strengths, and ionization and recombination rate coefficients for Li, Li^{+}, and Li^{2+}. The first stage database is constructed using the *R*-matrix with pseudo-states, time-dependent close-coupling, converged close-coupling, and perturbative distorted-wave methods. A second stage collision database is then assembled which contains generalized collisional-radiative and radiated power loss coefficients. The second stage database is constructed by solution of collisional-radiative equations in the quasi-static equilibrium approximation using the first stage database. Both collision database stages reside in electronic form at the ORNL Controlled Fusion Atomic Data Center and in the ADAS database, and are easily accessed over the worldwide internet.

* Corresponding author. Fax: +1 334 844 4613.
E-mail address: loch@physics.auburn.edu (S.D. Loch).

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Contents

1. Introduction

Accurate atomic and molecular databases underpin current research efforts in a variety of scientific and engineering areas, including controlled fusion energy, astrophysics, radiation biophysics, fluorescent lamps, and atmospheric pollutant removal [1]. In particular, lithium is used in diagnostic neutral beams to determine local plasma parameters in current magnetic fusion experiments. Lithium is injected into tokamak plasmas so that its flow and subsequent ionization can be monitored spectroscopically. The observations are then compared with the results of plasma impurity transport codes [2], which rely heavily on the accuracy of the underlying atomic collision database. In this paper we report on the construction of an electron–ion collision database for the modeling of lithium emission in plasmas, for both fusion and astrophysical applications. We present tables of all the fundamental data, along with a brief description of each dataset, and references to the original calculations from which the data were compiled.

Effective collision strengths are obtained from recent R-matrix with pseudo-states calculations of excitation cross sections for Li [3,4], Li^{+} [5], and Li^{2+} [6]. Ionization rate coefficients are obtained from recent converged close-coupling, time-dependent close-coupling, and distorted-wave calculations of ionization cross sections of Li [7–9], Li^{+} [10], and Li^{2+} [11]. Recombination rate coefficients are obtained from recent intermediate-coupling distorted-wave calculations for first and second row ionization stages of all atoms [12]. All the effective collision strengths and rate coefficients are obtained from a Maxwellian convolution of the cross sections and stored in electronic form at the ORNL Controlled Fusion Atomic Data Center (CFADC) [13].

Making use of the complete electron–ion collision database for lithium, the collisional-radiative codes found in the Atomic Data and Analysis Structure (ADAS) package [14,15] are employed to derive generalized collisional-radiative and radiated power loss coefficients for the ground and metastable terms of each ionization stage of lithium. These generalised collisional-radiative coefficients can be used by subsequent plasma transport codes to track the evolution of the ground and metastable term populations of the Li ions. All the ADAS derived generalised collisional-radiative and radiative power loss coefficients are stored in electronic format at the ORNL CFADC [13] and in the ADAS database [15].

The generalised collisional-radiative methodology for light species is outlined in the recent work of Summers et al. [16]. We note that the present paper will form part of a series providing generalised collisional-radiative data for the modelling of light species, using the method given in Summers et al. [16]. Thus, the present work is to be followed by a data paper on Be, and work is underway on papers on carbon and other elements of interest.

The remainder of this paper is organized as follows. In Section 2 we give a brief review of the theoretical and computational methods used to generate the electron-impact excitation, ionization, and recombination cross sections and rates forming the first stage collision database. In Section 3 we describe the generalised collisional-radiative data which is generated from the first stage data. In Section 4 we describe the line power loss coefficients which is generated from the first stage data. In Section 5 we summarize our findings and discuss future directions.

2. First stage collision database

2.1. Electron–ion excitation

Excitation cross sections for the 36 transitions among the $1s^22l$, $1s^23l$, and $1s^24l$ configurations of Li were calculated using the *R*-matrix with pseudo-states (RMPS) method [3,4]. The RMPS calculation included 55 states, of which 9 were spectroscopic and the remaining 46 were pseudo-states used to represent high Rydberg states and the target continuum. We note that the spectroscopic states correspond to real states, between which we calculate excitation collision strengths. The pseudo-states are included in the calculation to account for coupling of the spectroscopic states to the continuum [17,18]. Such coupling affects both the structure of the spectroscopic states, and the values for the effective collision strengths between the spectroscopic states. The role of the pseudo-states in the calculations we use here is described more fully in the original papers for each of the calculations [3–6]. The time-dependent close-coupling (TDCC) method generated cross sections for the eight transitions $1s^22s \rightarrow 1s^22p$, $1s^23l$, and $1s^24l$ that were in good agreement with the RMPS calculations at intermediate incident energies [3,4]. The RMPS and TDCC results were found to be in relatively good agreement with the results of earlier converged close-coupling (CCC) calculations [19] for the four transitions $1s^22s \rightarrow 1s^22p$ and $1s^23l$, but were found to be noticeably lower than the CCC results for the 4 transitions $1s^22s \rightarrow 1s^24l$. Good agreement was found between the various non-perturbative calculations and experimental measurements [20] for the $2s \rightarrow 2p$ transition. Our tabulated data consists of effective collision strengths, Υ, which were obtained by Maxwellian convolution of the RMPS cross sections for all 36 transitions using the equation

$$\Upsilon_{ij}(T_e) = \int_0^\infty \omega_i \frac{\varepsilon_i}{I_H} \frac{\sigma_{i\rightarrow j}(\varepsilon_i)}{\pi a_0^2} e^{-\varepsilon_j/kT_e} d\left(\frac{\varepsilon_j}{kT_e}\right), \quad (1)$$

where I_H is the Rydberg unit of energy, ω_i is the statistical weight of the initial term, $\sigma_{i\rightarrow j}$ is the cross sections for transition $i \rightarrow j$, ε_i and ε_j are the energies of the incident and outgoing electrons, respectively, a_0 is the Bohr radius, k the Boltzmann constant, and T_e the electron temperature. Note that one can transform the effective collision strength into a rate coefficient via the equation

$$q_{j\rightarrow i} = 2\sqrt{\pi}\alpha c a_0^2 \frac{1}{\omega_j} \frac{I_H}{kT_e} \Upsilon_{ij}, \quad (2)$$

where α is the fine structure constant and c is the speed of light. The numerical entry form for the Li effective collision strengths in the collision database is presented in Table 1. Note that the excitation, ionization and recombination data are contained in a single file for each ion stage. Thus, Table 1 also contains the ionization and recombination data for neutral lithium, while Tables 2 and 3 contain the fundamental data for Li^+ and Li^{2+}, respectively. Effective collision strengths for the transitions $1s^22s \rightarrow 1s^22p$ and $1s^23l$ in neutral Li are shown in Fig. 1.

Excitation cross sections for the 171 transitions among the LS terms of the $1s^2$, $1s2l$, $1s3l$, and $1s4l$ configurations of Li^+ were calculated using the *R*-matrix with pseudo-states method by Ballance et al. [5]. The RMPS calculation included 101 states, of which 19 were spectroscopic and the remaining 82 were pseudo-states. Because of the presence of both singlet and triplet terms in the Li^+ ion stage, it naturally requires more pseudo-states than the neutral Li or the Li^{2+} ion stages. We also note that the original paper for the Li^+ calculation [5] contains a study of the convergence of the calculation with the number of pseudo-states. The RMPS results were found to be in good agreement with earlier RMPS calculations of Brown et al. [21] for the 4 LS transitions within $1s^2 \rightarrow 1s2l$. Effective collision strengths were obtained by Maxwellian convolution of the RMPS cross sections for all 171 transitions. Effective collision strengths for the LS transitions within $1s^2 \rightarrow 1s2l$ are shown in Fig. 2, with all of the data being displayed in Table 2.

Excitation cross sections for the 105 transitions among the 1s, 2l, 3l, 4l, and 5l configurations of Li^{2+} were calculated

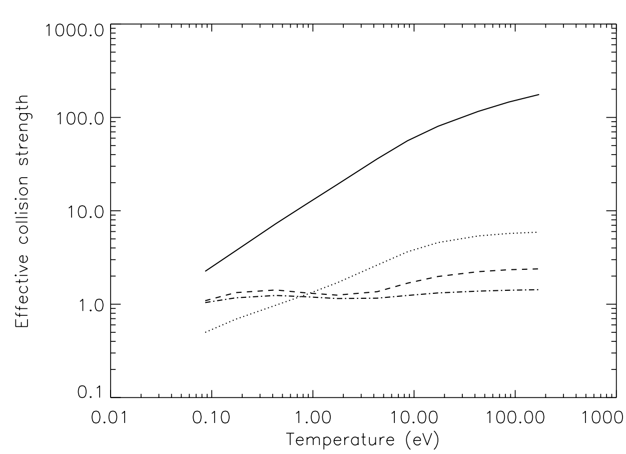

Fig. 1. Effective collision strength for transitions in neutral lithium. The solid line is the $1s^22s\ ^2S \rightarrow 1s^22p\ ^2P$ transition, the dashed line is the $1s^22s\ ^2S \rightarrow 1s^23s\ ^2S$, the dashed-dotted line is the $1s^22s\ ^2S \rightarrow 1s^23p\ ^2P$ transition and the dotted line is the $1s^22s\ ^2S \rightarrow 1s^23d\ ^2D$.

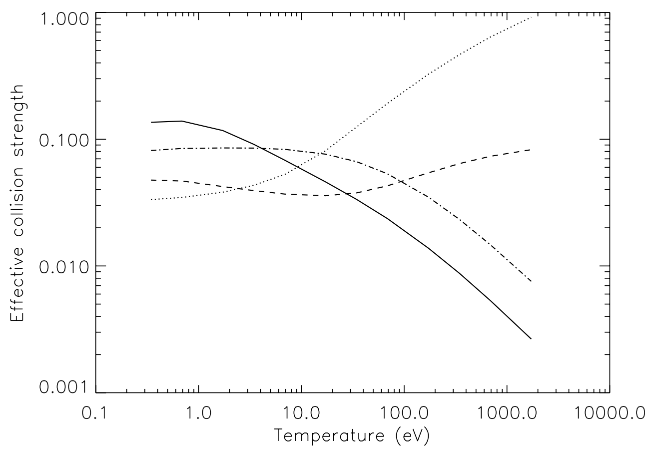

Fig. 2. Effective collision strength for transitions in Li^{+}. The solid line is the $1s^2\ ^1S \rightarrow 1s2s\ ^3S$ transition, the dashed line is the $1s^2\ ^1S \rightarrow 1s2s\ ^1S$, the dashed-dotted line is the $1s^2\ ^1S \rightarrow 1s2p\ ^3P$ transition and the dotted line is the $1s^2\ ^1S \rightarrow 1s2p\ ^1P$.

using the *R*-matrix with pseudo-states method by Ballance et al. [6]. The RMPS calculations included 39 states, of which 15 were spectroscopic and the remaining 24 were pseudo-states. Effective collision strengths were obtained by Maxwellian convolution of the RMPS cross sections for all 105 transitions. All of these data are shown in Table 3.

In the *R*-matrix calculations that we use for the excitation data, there is, of course, an underlying atomic structure calculation. Significant effort was put in to optimising the structure and comparing the calculated term energies and oscillator strengths with the accepted values from NIST [22]. For example, for the Li^{+} ion stage, the term energies are within 0.5% of the NIST values, and the stronger dipole radiative transitions are within 10% of the NIST values. A more complete comparison of the structure used in the excitation calculations is given in the original papers for each of the calculations [3–6]. The impact of different qualities of excitation data on derived plasma quantities is given in the paper of Loch et al. [23].

2.2. Electron–ion ionization

Ionization cross sections for the transitions $1s^22l \rightarrow 1s^2 + e^-$ of Li were calculated using both the *R*-matrix with pseudo-states and the time-dependent close-coupling methods [7,8]. The RMPS and TDCC results were found to be in good agreement with the results of earlier converged close-coupling calculations for the $1s^22s \rightarrow 1s^2 + e^-$ [24] and $1s^22p \rightarrow 1s^2 + e^-$ [19] transitions, the differences being less that 5%. Ionization cross sections for the transitions $1s^23l \rightarrow 1s^2 + e^-$ were taken from earlier CCC calculations [19]. The ionization cross section for the transition $1s^22s \rightarrow 1s2s^3S + e^-$ was calculated using the configuration-average distorted-wave (CADW) method [25], with the LS term resolution branching factors of Sampson [26]. Since the CADW results were found to be almost a factor of 2 higher than the TDCC results for the $1s^22l \rightarrow 1s^2 + e^-$ transitions [8], further non-perturbative calculations need to be performed to check the accuracy of the CADW results for $1s^22s \rightarrow 1s2s^3S + e^-$. The transitions $1s^24l \rightarrow 1s^2 + e^-$ were calculated using the ECIP (Exchange Classical Impact Parameter) approximation [27]. The accuracy of this semi-empirical expression for higher *n*-shells also needs to be validated against non-perturbative calculations. Ionization rate coefficients were obtained by Maxwellian convolution of the TDCC, CCC, and CADW cross sections for all 10 transitions. Ionization rates for the $1s^22l \rightarrow 1s^2 + e^-$ and $1s^22s\ ^1S \rightarrow 1s2s\ ^3S + e^-$ transitions are shown in Fig. 3. The ionization data for neutral Li is contained in Table 1.

Ionization cross sections for the transition $1s^2 \rightarrow 1s + e^-$ of Li^{+} were calculated using the *R*-matrix with pseudo-states and the time-dependent close-coupling methods [10]. The RMPS and TDCC results were found to be in good agreement with experimental measurements [28] and configuration-average distorted-wave results [10]. Ionization cross sections for the transitions $1snl^{1,3}L \rightarrow 1s + e^-$ for $n = 2$–4 were calculated using the CADW method. Ionization rate coefficients were obtained by Maxwellian convolution of the TDCC and CADW cross sections for all 19 transitions. Ionization rates for the $1s^2 \rightarrow 1s + e^-$ and $1s2l \rightarrow 1s + e^-$ transitions are shown in Fig. 4, and all the rate coefficient data are contained in Table 2.

Ionization cross sections for the transition $1s \rightarrow e^-$ of Li^{2+} were calculated using the time-dependent close-coupling method [11]. The TDCC results were found to be in good agreement with experimental measurements [29] and configuration-average distorted-wave results [11], with the differences between the TDCC and CADW results being less than 5%. Ionization cross sections for the transitions $nl \rightarrow e^-$ for $n = 2$–4 were calculated using the CADW method. Ionization rate coefficients were obtained by Maxwellian convolution of the TDCC and CADW cross sections for all 10 transitions, and are contained in Table 3. Note that greater details regarding the comparison of the present calculations, upon which our tabulated data are

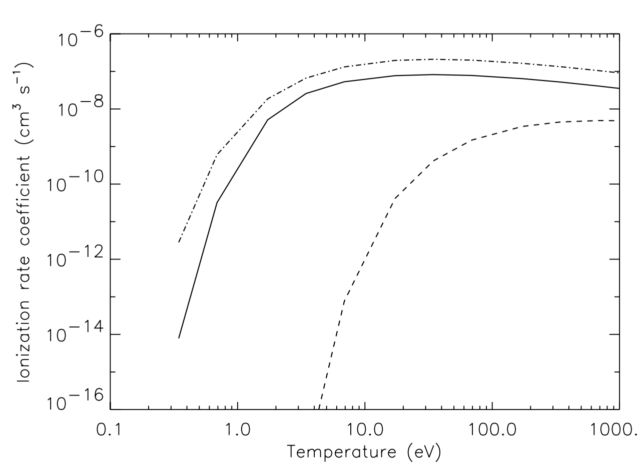

Fig. 3. Ionization rate coefficient for neutral lithium. The solid line is the $1s^22s\ ^2S \rightarrow 1s^2\ ^1S$ transition, the dashed line is the $1s^22s\ ^2S \rightarrow 1s2s\ ^3S$, the dashed-dotted line is the $1s^22p\ ^2P \rightarrow 1s^2\ ^1S$.

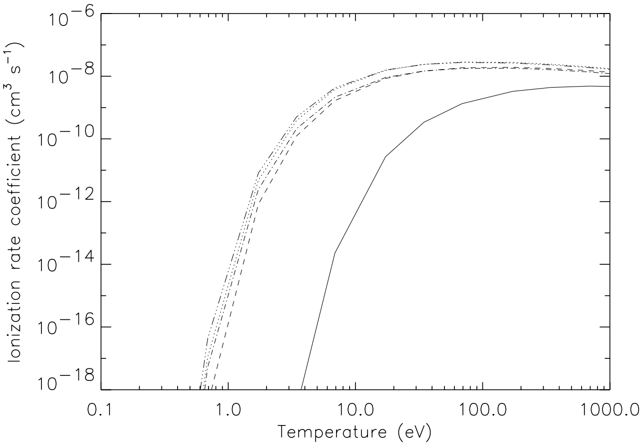

Fig. 4. Ionization rate coefficient for Li^+. The solid line is the $1s^2\ ^1S \rightarrow 1s\ ^2S$ transition, the dashed line is the $1s2s\ ^3S \rightarrow 1s\ ^2S$ transition, the dashed-dotted line is the $1s2s\ ^1S \rightarrow 1s\ ^2S$ transition, the dotted line is the $1s2p\ ^3P \rightarrow 1s\ ^2S$ transition, and the dashed triple-dotted dashed line is the the $1s2p\ ^1P \rightarrow 1s\ ^2S$ transition.

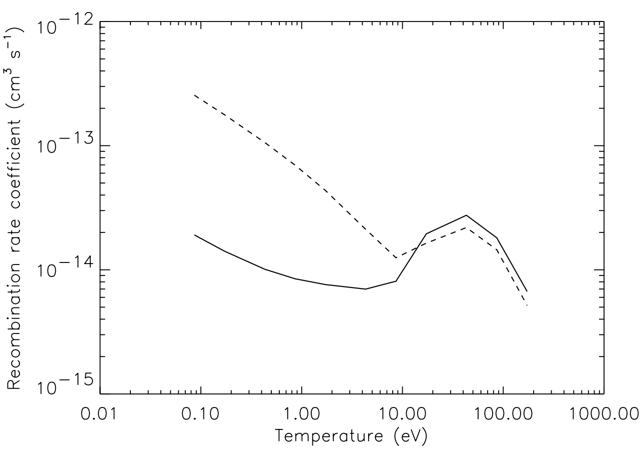

Fig. 5. Recombination rate coefficients for $Li^+ \rightarrow Li$. The solid line is the $1s^2\ ^1S + e^- \rightarrow 1s^22s\ ^2S$, the dashed line is $1s^2\ ^1S + e^- \rightarrow 1s^22p\ ^2P$.

based, with other theoretical methods and experimental results can be found in the original papers for each of the calculations [7,8,10,11,19,24].

2.3. Electron–ion recombination

Recombination cross sections for the transitions $1s^2 + e^- \rightarrow 1s^2nl$ for $n = 2$–4 and $l = 0$–3 of Li^+ were calculated using the distorted-wave method [12]. The data include both radiative and dielectronic recombination processes. Recombination rate coefficients were obtained by Maxwellian convolution of the distorted-wave cross sections for all 29 transitions. Recombination rates for the $1s^2 + e^- \rightarrow 1s^22l$ transitions are shown in Fig. 5, with all of the rate coefficients being reported in Table 1.

Recombination cross sections for the transitions $1s + e^- \rightarrow 1snl$ for $n = 2$–4 and $l = 0$–3 of Li^{2+} were calculated using the distorted-wave method [12]. The results include both radiative and dielectronic recombination processes. Recombination rate coefficients were obtained by

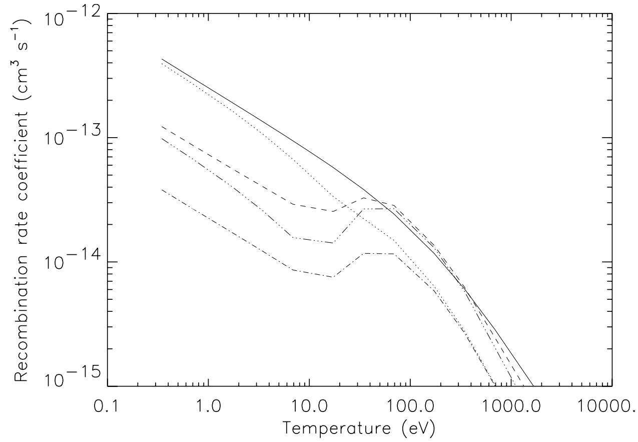

Fig. 6. Recombination rate coefficients for $Li^{2+} \rightarrow Li^+$. The solid line is the $1s\ ^2S + e^- \rightarrow 1s^2\ ^1S$, the dashed line is $1s\ ^2S + e^- \rightarrow 1s2s\ ^1S$, the dashed-dotted line is $1s\ ^2S + e^- \rightarrow 1s2s\ ^3S$, the dotted line is $1s\ ^2S + e^- \rightarrow 1s2p\ ^1P$ and the dashed triple-dotted line is $1s\ ^2S + e^- \rightarrow 1s2p\ ^3P$.

Maxwellian convolution of the distorted-wave cross sections for all 58 transitions. Recombination rates for the $1s + e^- \rightarrow 1s^2$ and $1s + e^- \rightarrow 1s2l$ transitions are shown in Fig. 6, and all of the rate coefficient data are displayed in Table 2.

2.4. High n-shell data

Before any derived atomic data can be produced, it is necessary to supplement the high quality, low *n*-shell, data presented in the previous sections with data involving the higher *n*-shells. This is done for a number of reasons. At low densities recombination into very high *n*-shells can become the dominant populating mechanism, such as in the solar corona [30]. Unless such rates are included, collisional-radiative models will not tend to the coronal limit at lower densities. Note that for the temperatures at which Li, Li^+ and Li^{2+} exist, the excited populations have coronal values up to electron densities $N_e \sim 1 \times 10^9$ cm^{-3} for Li, $N_e \sim 1 \times 10^{11}$ cm^{-3} for Li^{2+} and $N_e \sim 1 \times 10^{13}$ cm^{-3} for Li^{2+}. Second, at low temperatures or high densities, steady state ionization balance can be dominated by stepwise ionization processes involving *n*-shells greater than that for which non-perturbative excitation and ionization data normally exist.

Within the ADAS framework, the detailed low *n*-shell data presented above are supplemented with more approximate effective collision strengths and rate coefficients, typically for *n*-shells up to $n = 500$. These data are included in what is termed a 'projection matrix.' Only the condensed, projected rates from these higher *n*-shells onto the lower terms is used in the final collisional-radiative modeling. In this way one can include the effects of the higher *n*-shells on the lower lying populations. The atomic data used in the projection matrix are made up largely from semi-empirical expressions, such as the Gaunt factor approach outlined in Burgess and Summers [27], and the Exchange Classical Impact Parameter (ECIP) expression, also described in

[27]. The validity of such semi-empirical expressions was investigated recently via comparisons with non-perturbative calculations, see Griffin et al. [31].

The one exception to the use of semi-empirical data for higher n-shells is for dielectronic recombination, where we use distorted-wave data. Dielectronic recombination calculations normally include n-shells up to $n = 1000$. Such data has been found to be in good agreement with experimental data (see Badnell et al. [12]). For radiative recombination to higher n-shells we use a Gaunt factor approach as outlined in Summers and Hooper [32].

Work is in progress to further test the various approximate techniques for higher n-shells which are used for excitation, ionization and recombination processes. Where possible we intend to compare these expressions against non-perturbative calculations.

3. Second stage collision database

The first stage atomic rate coefficients presented above can be used directly to calculate term populations via the collisional-radiative equations:

$$\frac{dN_j^z}{dt} = -\sum_{j'<j} A_{j\to j'} N_j^z - N_e \sum_{j'\neq j} q_{j\to j'} N_j^z + \sum_{j'>j} A_{j'\to j} N_{j'}^z + N_e \sum_{j'\neq j} q_{j'\to j} N_{j'}^z - N_e \sum_k \mathscr{S}_{j\to k} N_j^z + N_e \sum_k \mathscr{R}_{k\to j} N_k^{z+1}, \quad (3)$$

where $A_{j\to j'}$ are radiative decay rates, $q_{j\to j'}$ are electron-impact excitation and de-excitation rate coefficients, $\mathscr{S}_{j\to k}$ are electron-impact ionization rates, $\mathscr{R}_{k\to j}$ are radiative and dielectronic recombination rates, N_e is the electron density, and N_j^z is the term population in ion stage z. Other important source and loss terms may be added to the collisional-radiative equations to describe a variety of different plasmas. Note that we ignore recombination from excited states, and ionization into excited states in Eq. (3), and in the data described in Section 2.

For many plasma conditions, the ground and metastable term populations evolve on a much slower timescale than the excited term populations, allowing the time derivatives of the excited term populations to be set to zero. Using Greek letters to denote ground and metastable terms (α for ion stage $z-1$, β for ion stage z, and γ for ion stage $z+1$), and Latin letters to denote excited terms (i for ion stage $z-1$, j for ion stage z, and k for ion stage $z+1$), the collisional-radiative equations may be solved [33] in the quasi-static equilibrium approximation to yield:

$$\frac{dN_\beta^z}{dt} = -N_e \sum_{\beta\neq\beta'} (X_{\beta\to\beta'} + Q_{\beta\to\beta'}) N_\beta^z + N_e \sum_{\beta'\neq\beta} (X_{\beta'\to\beta} + Q_{\beta'\to\beta}) N_{\beta'}^z - N_e \sum_\gamma S_{\beta\to\gamma} N_\beta^z + N_e \sum_\alpha S_{\alpha\to\beta} N_\alpha^{z-1} + N_e \sum_\gamma R_{\gamma\to\beta} N_\gamma^{z+1} - N_e \sum_\alpha R_{\beta\to\alpha} N_\beta^z. \quad (4)$$

The coefficients in this equation are often referred to as the generalised collisional-radiative coefficients. The cross-coupling rate coefficients are given by

$$X_{\beta\to\beta'} = \left(\mathscr{C}_{\beta'\beta}^z - \sum_j \mathscr{C}_{\beta' j}^z \sum_{j'} \left(\mathscr{C}_{jj'}^z \right)^{-1} \mathscr{C}_{j'\beta}^z \right) \Big/ N_e, \quad (5)$$

where the collisional-radiative matrix elements for ion stage z are given by:

$$\mathscr{C}_{jj}^z = \sum_{j'<j} A_{j\to j'} + N_e \sum_{j'\neq j} q_{j\to j'}, \quad (6)$$

$$\mathscr{C}_{jj'}^z = -A_{j'\to j} - N_e q_{j'\to j} \quad \text{for } j' > j, \quad (7)$$

$$\mathscr{C}_{jj'}^z = -N_e q_{j'\to j} \quad \text{for } j' < j. \quad (8)$$

The effective ionization rate coefficients are given by

$$S_{\beta\to\gamma} = \mathscr{S}_{\beta\to\gamma} - \sum_j \mathscr{S}_{j\to\gamma} \sum_{j'} (\mathscr{C}_{jj'}^z)^{-1} \mathscr{C}_{j'\beta}^z, \quad (9)$$

$$S_{\alpha\to\beta} = \mathscr{S}_{\alpha\to\beta} - \sum_i \mathscr{S}_{i\to\beta} \sum_{i'} (\mathscr{C}_{ii'}^{z-1})^{-1} \mathscr{C}_{i'\alpha}^{z-1}. \quad (10)$$

The effective recombination rate coefficients are given by

$$R_{\gamma\to\beta} = \mathscr{R}_{\gamma\to\beta} - \sum_j \mathscr{C}_{\beta j}^z \sum_{j'} (\mathscr{C}_{jj'}^z)^{-1} \mathscr{R}_{\gamma\to j'}, \quad (11)$$

$$R_{\beta\to\alpha} = \mathscr{R}_{\beta\to\alpha} - \sum_i \mathscr{C}_{\alpha i}^{z-1} \sum_{i'} (\mathscr{C}_{ii'}^{z-1})^{-1} \mathscr{R}_{\beta\to i'}. \quad (12)$$

The parent cross-coupling rate coefficients are given by

$$Q_{\beta\to\beta'} = N_e \sum_i \mathscr{S}_{i\to\beta'} \sum_{i'} (\mathscr{C}_{ii'}^{z-1})^{-1} \mathscr{R}_{\beta\to i'}. \quad (13)$$

Using the first stage atomic rate coefficients we construct the collisional-radiative matrix and in turn the generalized collisional-radiative coefficients of Eqs. (5), (9)–(13); these represent our second stage data. In going from Eq. (3) to Eq. (4) we have greatly reduced the number of equations needed to be solved at each time step in the plasma's evolution. Again, other important source and loss terms may be added to the generalized collisional-radiative equations to describe a variety of different plasmas.

It should be noted that the second stage data are functions of density as well as temperature, and are thus tabulated on a T_e, N_e grid. The density effect comes in through collisional processes. For example, one can see that the effective ionization rate coefficient of Eqs. (9) and (10) takes into account stepwise excitation to terms which can then collisionally ionize.

Figs. 7 and 8 show sample effective rate coefficient results for the expressions in Eqs. (9) and (11) for Li as a function of temperature and density. The data for each of the generalised collisional-radiative coefficients are contained in Tables 4–7 for the R, S, Q, and X effective rate coefficients, respectively. The effective collisional-radiative rate coefficients also include the effects of highly excited configurations, typically up to $n = 500$, projected onto the lower term populations, with the data for these highly excited n-shells consisting of more approximate data, as described in Section 2.4.

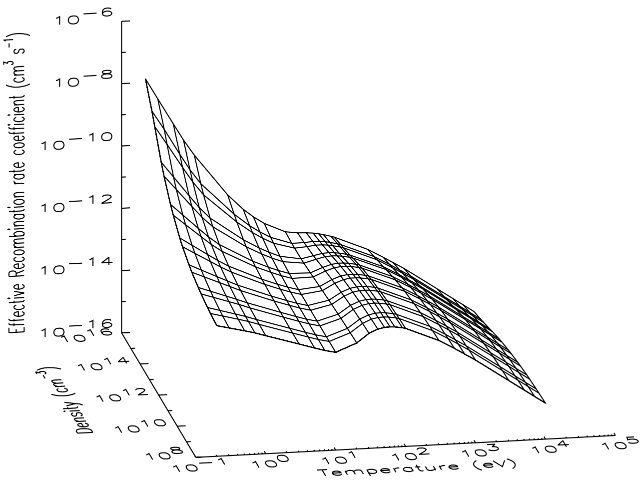

Fig. 7. Effective recombination rate coefficient for the recombination process $e + Li^{+}\ (1s^2\ ^1S) \rightarrow Li\ (1s^2\ 2s\ ^2S)$ as a function of electron temperature and density.

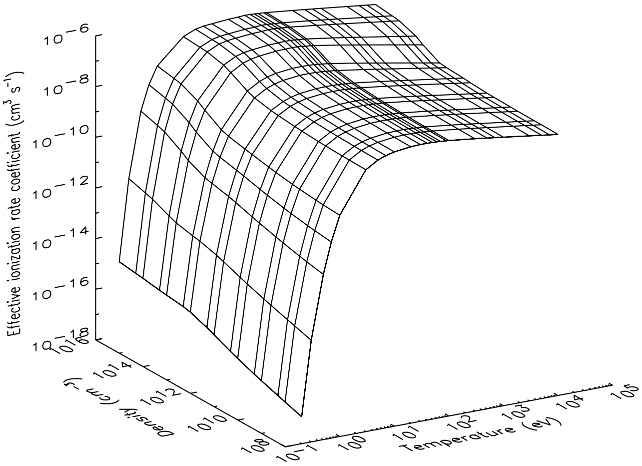

Fig. 8. Effective ionization rate coefficient for the ionization process $e + Li\ (1s^2\ 2s\ ^2S) \rightarrow Li^{+}\ (1s^2\ ^2S) + 2e$ as a function of electron temperature and density. Note that the density dependence comes in through the role of ionization from excited states.

4. Radiated power loss

The radiated power loss (RPL) function from a single excited term j, due to all possible bound–bound spectral line transitions is given by

$$\mathrm{RPL}_j^z = \sum_{j'<j} \frac{A^z_{j\rightarrow j'} \Delta E^z_{jj'} N^z_j}{N_\mathrm{e}\, N_\mathrm{tot}}, \tag{14}$$

where $A^z_{j\rightarrow j'}$ is the spontaneous emission rate for transition $j \rightarrow j'$, $\Delta E^z_{jj'}$ is the corresponding transition energy and N^z_j is the excited term population of ion stage z. Note that N^z_j can be expressed in terms of collisional-radiative matrix elements, and split into contributions which come from excitation and recombination from the ground/metastable terms of the z and $z+1$ ion stages, respectively. Thus, the total line radiated power loss from an ion is given by Eq. (14) summed over all the excited terms j. The ground and metastable populations for use in Eq. (14) are usually evaluated as part of a separate calculation, either using the effective rate coefficients from Section 3 and Eq. (4), or from the results of a plasma transport code. Thus, the most flexible tabulation of the power loss coefficients is via the display of coefficients which are independent of the ground and metastable populations. The total radiated power loss, due to spectral line emission from all the ionization stages is given by

$$\mathrm{RPL}(T_\mathrm{e}, N_\mathrm{e}) = \sum_\beta \frac{P^z_{LT,\beta} N^z_\beta}{N_\mathrm{tot}} + \sum_\gamma \frac{P^z_{\mathrm{rec},\gamma} N^{z+1}_\gamma}{N_\mathrm{tot}}, \tag{15}$$

where

$$P^z_{\mathrm{LT},\beta} = \sum_j \sum_{j'<j} A^z_{j\rightarrow j'} \Delta E^z_{jj'} \left[-\sum_{j''} \mathscr{C}^{-1}_{jj''} \mathscr{C}_{j''\beta} \right] / N_\mathrm{e}, \tag{16}$$

$$P^z_{\mathrm{rec},\gamma} = \sum_j \sum_{j'<j} A^z_{j\rightarrow j'} \Delta E^z_{jj'} \left[N_\mathrm{e} \sum_{j''} \mathscr{C}^{-1}_{jj''} \mathscr{R}_{j''\gamma} \right] / N_\mathrm{e}. \tag{17}$$

Thus, we tabulate power loss data according to these two equations for the total excitation line power (P_LT), and the total recombination line power (P_rec). Note that the $P^z_{\mathrm{rec},\gamma}$ coefficient gives the line power loss due to emission from the excited terms in the z ion stage, where these terms are populated due to recombination from the $z+1$ ion stage. It does not give the power loss due to free-bound radiation. These coefficients can be combined with ground and metastable population to produce the total radiated power loss via Eq. (15). We display the $P^z_{\mathrm{LT},\beta}$ and $P^z_{\mathrm{rec},\gamma}$ coefficients on a temperature/density grid, similar to the effective rate coefficient described previously. Tables 8 and 9 give the total excited line power loss and total recombination line power loss data. In Fig. 9 we show the total excited line power loss coefficient as a function of temperature and density. Note that the $P^z_{\mathrm{LT},\beta}$ and $P^z_{\mathrm{rec},\gamma}$ coefficients here have already been summed over all transitions. They represent the total power loss, over all wavelengths. One can also evaluate line specific power loss coefficients, called photon emissivity coefficients, for

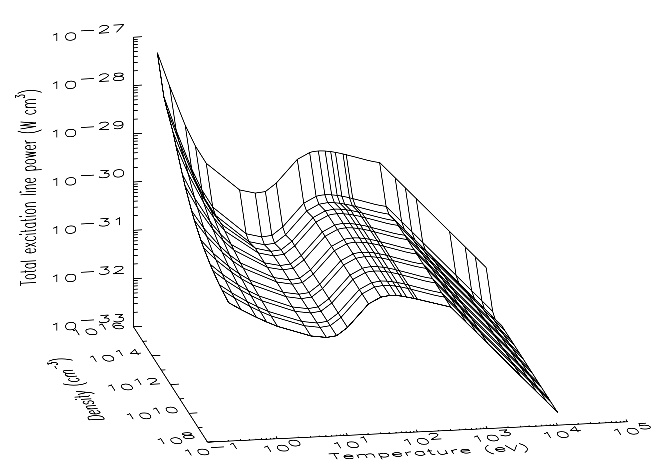

Fig. 9. Total excitation line power loss coefficient for the neutral Li $1s^2\ 2s\ ^2S$ ground term as a function of electron temperature and density.

each possible spectral transition. These photon emissivity coefficients are equal to the individual elements in the $j\,j'$ summation of Eqs. (16) and (17). These wavelength specific coefficients may be requested from the authors.

Thus, to calculate the total radiated line power loss, one needs to first evaluate the ground and metastable populations (N_{β}^{z} and N_{γ}^{z+1}) from Eq. (4), and then combine the results with the power loss coefficients described here. The sensitivity of the equilibrium radiated power for lithium to the underlying excitation data was investigated by Loch et al. [23]. It was found that one must use non-perturbative excitation data (e.g. *R*-matrix with pseudo states) for all ion stages. The work of Loch et al. [23] also shows many equilibrium calculations using the effective rate coefficients and power loss coefficients, if the reader wants to compare the results with that of their own codes.

The derived data given here were produced using the ADAS suite of codes [15] through collisional-radiative calculations. The derived data (both the effective rate coefficients and the total power loss coefficients) are also available through the CFADC [13] and in the ADAS database [15].

5. Summary

A new dataset for lithium is presented, consisting of the highest quality data available for electron impact excitation, ionization and recombination. For lower *n*-shells this consists of *R*-matrix with pseudo-states data for excitation processes, converged close coupling, time-dependent close-coupling and distorted-wave data for ionization processes and intermediate-coupling distorted-wave data for recombination processes. For processes involving higher *n*-shells, typically $n \geqslant 4$ or 5, various approximate expressions are used, and where possible comparisons are made with recent non-perturbative calculations. Work is in progress to determine the accuracy of such approximate expressions for a range of atomic systems. In this paper, a selection of the fundamental data is presented. Derived quantities are also presented, namely generalised collisional-radiative rate coefficients and total line power loss coefficients. The complete dataset is archived in the ADAS database [15] and at the CFADC [13].

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Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.adt.2006.04.001.

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Explanation of Tables

Table 1. **First stage collisional datafile for neutral Li**

ADAS format [15] datafile for neutral Li, containing the stage one excitation, ionization and recombination data. Each line has a specific format

On *Line 1* is the element symbol, with ion charge. Then follows the nuclear charge, then the ion charge plus one. Then there is the ionization potential (in cm^{-1}) for the transition $1s^2\ 2s\ ^2S \rightarrow 1s^2\ ^1S$, with the term for the ionized system within a set of brackets after the ionization potential. Then there is the ionization potential (in cm^{-1}) for the $1s^2\ 2s\ ^2S \rightarrow 1s\ 2s\ ^3S$ transition, with the term for the ionized system in brackets after the ionization potential.

On *lines 2–10* is the list of term descriptions. The data format on each of these lines is the same. Thus, each of these lines starts with the index number which will be used to identify the term. Then there is the configuration, followed by $(2S + 1)L(X)$, where $2S + 1$ is the multiplicity of the term, L is the total angular momentum of the term, and X is such that $(2 \times X) - 1$ is the statistical weight of the term. Then one has the excited energy of the term (in cm^{-1}) relative to the ground term

Line 12 contains the temperature grid on which the data has been tabulated. The first number on the line is the ion charge plus one, then we have an index number representing the data type in the file. The number 3 represents electron collisional data, in effective collision strength form. Then there are a list of 11 temperatures (in K) on which the effective collision strengths are tabulated

Then on *lines 13–39* is the electron impact excitation data. The format for each line is the same, with the first two numbers being the term index numbers of the initial and final terms involved in the excitation. The next number is the Einstein A-value for that transition (in s^{-1}). Then there is a set of 11 numbers, which are the effective collision strengths for the transition at each of the 11 points on the temperature grid

The recombination data can be found on *lines 40–58*. The letter R at the beginning of the line indicates that recombination data is to follow. Then one has the term index of the term that is being recombined into. The next number, with the plus beside it, is the index number for the ground or metastable of the adjacent ion stage, from which the recombination originates. Thus $a + 1$ indicates that it is recombining from the ground term of the next ion stage. There then follows 11 recombination rate coefficients ($cm^3\ s^{-1}$) on the 11 temperature points of the grid

On *lines 59–64* is the ionization rate coefficient data. Again, each line has the same format. The letter S at the beginning of the line indicates ionization data. The next number is the term index of the term which one is ionizing from. Then follows the index number of the ground or metastable term of the adjacent ion stage. Thus $a + 2$ indicates that one is ionizing to the first metastable term on the adjacent stage. Note that it is the scaled ionization rate coefficient which is given. Thus, the tabulated rate coefficient is the ionization rate coefficient ($cm^3\ s^{-1}$) multiplied by e^{I_{ion}/kT_e}, where I_{ion} is the ionization potential of the term being ionized, k is Boltzmann's constant, and T_e is the electron temperature

Table 2. **First stage collisional datafile for Li^+**

Datafile for Li^+, containing the stage one excitation, ionization and recombination data. The data format is the same as for Table 1. Note that the ionization potential on line 1 now describes the transition $1s^2\ ^1S \rightarrow 1s\ ^2S$ with the term label in brackets after the ionization potential being the term of the ionized system

Table 3. **First stage collisional datafile for neutral Li^{2+}**

Datafile for Li^{2+}, containing the stage one excitation, ionization and recombination data. The data format is the same as for Table 1. Note that the ionization potential on line 1 now describes ionization of the $n = 1$ electron. Note that the data for the H-like Li case is now n-shell resolved, all of the term resolved data has been bundled into n-shells, due to the strong mixing between the degenerate $n\ell$ subshells in hydrogenic ions

Table 4. **Effective recombination data for all ion stages of Li**

Effective recombination data for all ion stages of lithium, on a temperature, density grid. The format for the effective recombination, ionization, and cross coupling coefficients files is the same

On *line 1*, the list of numbers represents the nuclear charge, the number of electron density points for the grid, the number of electron temperature points for the grid, the lowest ion charge for which there is data in the file and the highest ion charge for which there is data in the file. At the end of line one is the name of the atom, and the project title

On *line 3* is the number of ground and metastable levels in the dataset for Li, Li^{+} and Li^{2+} and the bare lithium nucleus (which the file counts as having a ground term, so that it can have an index number to label it
On *lines 5 and 6* are the 16 electron temperatures which make up the temperature grid. Log_{10} of the electron temperature is given, with the electron temperature in units of eV
On *lines 7–10* are the 25 electron densities which make up the density grid. Log_{10} of the electron density is given, with the electron density in units of cm^{-3}
Line 11 is a labelling line to indicate which ion stage is to be described. IPRT is the parent index number for the transition, IGRND is the ground term index. Z1 is the ion charge plus one, and the date the data was assembled is at the end of the line
Lines 12–52 describe one T_e value at a time, and list Log_{10} of the effective recombination rate coefficient for each of the electron densities on the grid

- Thus *lines 12 and 13* give the values for the first electron temperature, for each of the 25 electron density values
- *Lines 14 and 15* provide the data for the next temperature
- etc.

Line 53 then gives a second labelling line, indicating that the following data is for the next ion stage
Lines 54–104 are of the same format as lines 12–52, with the data corresponding to the recombination from the 1s 2s ^{3}S metastable of the Li^{+} ion stage into the 1s^2 2s ^{2}S term of the neutral stage. In the same way, there are three more sets of effective recombination rate coefficients given, for recombination from transitions 1s ^{2}S into 1s^2 ^{1}S, 1s ^{2}S into 1s^2 ^{3}S and the bare nucleus into 1s ^{2}S

Table 5. Effective ionization data for all ion stages of Li
Effective ionization data for all ion stages of lithium, on a temperature, density grid. The format of the file is identical to that for the effective recombination datafile (Table 4). The data in this case are Log_{10} of the effective ionization rate coefficient, and the same electron temperature and density grid is used

Table 6. Effective *Q* coefficient data for all ion stages of Li
Q rate coefficient data for all ion stages of lithium, on a temperature, density grid. The format of the file is identical to that for the effective recombination datafile (Table 4). The data are Log_{10} of the *Q* rate coefficient

Table 7. Effective *X* coefficient data for all ion stages of Li
X rate coefficient data for all ion stages of lithium, on a temperature, density grid. The format of the file is identical to that for the effective recombination datafile (Table 4). The data are Log_{10} of the *X* rate coefficient

Table 8. Total excitation line power loss data for all ion stages of Li
Total excitation line power loss data for all ion stages of lithium, on a temperature, density grid. The format of the file is identical to that for the effective recombination datafile (Table 4). The data are Log_{10} of the total excitation line power loss coefficient

Table 9. Total recombination line power loss data for all ion stages of Li
Total recombination line power loss data for all ion stages of lithium, on a temperature, density grid. The format of the file is identical to that for the effective recombination datafile (Table 4). The data are Log_{10} of the total recombination line power loss coefficient

Table 1
First stage collisional datafile for neutral Li. See page 821 for Explanation of Tables

Li+	0			3	1	43489.0(1S)	516797.0(3S)							
	1	1S2	2S1		(2)0(0.5)		0.0	{1}1.000	{2}1.500					
	2	1S2	2P1		(2)1(2.5)		14903.9	{1}1.000						
	3	1S2	3S1		(2)0(0.5)		27206.1	{1}1.000						
	4	1S2	3P1		(2)1(2.5)		30925.4	{1}1.000						
	5	1S2	3D1		(2)2(4.5)		31283.1	{1}1.000						
	6	1S2	4S1		(2)0(0.5)		35012.1	{1}1.000						
	7	1S2	4P1		(2)1(2.5)		36469.6	{1}1.000						
	8	1S2	4D1		(2)2(4.5)		36623.4	{1}1.000						
	9	1S2	4F1		(2)3(6.5)		36630.2	{1}1.000						
	−1													
	1.0		3	1.00+03	2.00+03	5.00+03	1.00+04	2.00+04	5.00+04	1.00+05	2.00+05	5.00+05	1.00+06	2.00+06
	2	1	3.75+07	2.25+00	3.73+00	7.29+00	1.18+01	1.90+01	3.59+01	5.63+01	8.04+01	1.16+02	1.46+02	1.76+02
	3	1	1.00−30	1.09+00	1.33+00	1.42+00	1.32+00	1.25+00	1.36+00	1. 68+00	1.98+00	2.23+00	2.34+00	2.39+00
	4	1	7.08+05	1.04+00	1.17+00	1.24+00	1.20+00	1.15+00	1.16+00	1.24+00	1.32+00	1.38+00	1.41+00	1.43+00
	5	1	2.94+02	4.99−01	6.90−01	9.76−01	1.27+00	1.69+00	2.62+00	3.64+00	4.57+00	5.38+00	5.72+00	5.91+00
	6	1	1.00−30	3.06−01	3.44−01	3.34−01	3.06−01	2.84−01	2.97−01	3.53−01	4.09−01	4.60−01	4.81−01	4.93−01
	7	1	1.02+06	2.99−01	3.37−01	3.47−01	3.47−01	3.40−01	3.40−01	3.57−01	3.73−01	3.88−01	3.94−01	3.97−01
	8	1	1.13+02	2.56−01	3.05−01	3.55−01	4.12−01	5.11−01	7.50−01	1.02+00	1.28+00	1.51+00	1.61+00	1.67+00
	9	1	1.00−30	2.22−01	2.56−01	2.79−01	2.93−01	3.08−01	3.38−01	3.63−01	3.83−01	4.02−01	4.10−01	4.15−01
	3	2	3.28+07	3.56+00	4.49+00	5.44+00	6.13+00	7.58+00	1.28+01	2.08+01	3.25+01	5.14+01	6.71+01	8.34+01
	4	2	3.09+01	8.05+00	8.97+00	9.71+00	1.02+01	1.12+01	1.42+01	1.79+01	2.08+01	2.29+01	2.38+01	2.42+01
	5	2	6.74+07	3.62+00	5.45+00	8.83+00	1.27+01	1.99+01	4.25+01	7.67+01	1.26+02	2.07+02	2.74+02	3.45+02
	6	2	1.01+07	2.06+00	2.09+00	1.80+00	1.53+00	1.36+00	1.54+00	2.13+00	2.93+00	4.21+00	5.29+00	6.41+00
	7	2	1.29+01	2.24+00	2.64+00	2.75+00	2.76+00	2.89+00	3.46+00	4.20+00	4.81+00	5.30+00	5.50+00	5.60+00
	8	2	2.25+07	2.17+00	2.46+00	2.81+00	3.33+00	4.56+00	8.80+00	1.50+01	2.25+01	3.40+01	4.35+01	5.35+01
	9	2	1.03+01	1.89+00	2.26+00	2.62+00	3.01+00	3.69+00	5.25+00	6.66+00	7.78+00	8.68+00	9.04+00	9.23+00
	4	3	3.82+06	1.17+01	1.34+01	2.31+01	4.99+01	1.12+02	2.78+02	4.74+02	6.76+02	9.44+02	1.15+03	1.35+03
	5	3	4.35−01	6.81+00	1.26+01	2.43+01	3.41+01	4.39+01	5.81+01	7. 01+01	7.73+01	8.20+01	8.36+01	8.44+01
	6	3	1.00−30	3.43+00	4.09+00	4.05+00	3.64+00	3.75+00	6.06+00	9. 48+00	1.18+01	1.34+01	1.39+01	1.42+01
	7	3	1.49+02	1.99+00	2.43+00	3.04+00	3.99+00	5.91+00	9.65+00	1.25+01	1.44+01	1.57+01	1.62+01	1.64+01
	8	3	7.27+00	2.66+00	3.22+00	3.64+00	4.19+00	5.63+00	8.99+00	1.17+01	1.35+01	1.48+01	1.52+01	1.54+01
	9	3	1.00−30	3.69+00	5.02+00	6.91+00	9.02+00	1.25+01	1.85+01	2. 23+01	2.48+01	2.64+01	2.71+01	2.74+01
	5	4	1.59+03	3.19+02	5.84+02	1.09+03	1.57+03	2.10+03	2.86+03	3.46+03	4.01+03	4.66+03	5.13+03	5.57+03
	6	4	7.34+06	6.43+00	8.39+00	1.27+01	2.09+01	3.86+01	9.10+01	1.62+02	2.47+02	3.71+02	4.70+02	5.70+02
	7	4	3.03+00	1.07+01	1.40+01	1.80+01	2.62+01	4.55+01	8.69+01	1.20+02	1.40+02	1.54+02	1.59+02	1.61+02
	8	4	6.85+06	1.05+01	1.38+01	1.90+01	2.71+01	4.73+01	1.15+02	2.13+02	3.45+02	5.48+02	7.13+02	8.83+02
	9	4	8.31+00	1.20+01	1.68+01	2.75+01	4.56+01	8.02+01	1.50+02	2.07+02	2.42+02	2.66+02	2.74+02	2.78+02
	6	5	8.15−01	1.13+01	1.42+01	1.66+01	1.80+01	1.95+01	2.28+01	2. 60+01	2.79+01	2.92+01	2.96+01	2.98+01
	7	5	4.92+05	1.29+01	1.59+01	1.87+01	2.19+01	2.68+01	3.32+01	3.75+01	4.38+01	5.42+01	6.28+01	7.18+01
	8	5	1.20+00	1.80+01	2.35+01	3.25+01	4.84+01	8.07+01	1.44+02	1.93+02	2.23+02	2.43+02	2.50+02	2.53+02
	9	5	1.38+07	2.73+01	3.72+01	5.83+01	1.04+02	2.21+02	5.76+02	1.02+03	1.53+03	2.24+03	2.80+03	3.37+03
	7	6	7.95+05	1.34+01	2.33+01	7.00+01	1.94+02	4.90+02	1.26+03	2.10+03	2.91+03	3.92+03	4.66+03	5.39+03
	8	6	5.86−02	1.36+01	2.61+01	6.40+01	1.17+02	1.90+02	2.95+02	3.60+02	3.96+02	4.18+02	4.25+02	4.29+02
	9	6	1.00−30	2.01+01	2.89+01	4.05+01	4.90+01	5.83+01	7.13+01	7.90+01	8.32+01	8.58+01	8.67+01	8.72+01
	8	7	5.57+02	1.38+03	2.35+03	4.50+03	6.75+03	9.36+03	1.31+04	1.60+04	1.86+04	2.17+04	2.39+04	2.59+04
	9	7	2.62−06	3.84+02	4.83+02	5.86+02	6.36+02	6.64+02	6.71+02	6.57+02	6.49+02	6.44+02	6.42+02	6.42+02
	9	8	1.04−02	1.74+04	2.02+04	2.36+04	2.61+04	2.87+04	3.21+04	3.45+04	4.57+04	7.38+04	1.03+05	1.37+05
R	1	+1		1.91−14	1.41−14	1.01−14	8.46−15	7.60−15	6.99−15	8.09−15	1.95−14	2.75−14	1.81−14	6.69−15
R	2	+1		2.55−13	1.77−13	1.06−13	6.96−14	4.35−14	2.12−14	1.25−14	1.64−14	2.19−14	1.45−14	5.16−15
R	3	+1		2.69−15	2.12−15	1.74−15	1.65−15	1.65−15	1.65−15	1.55−15	1.43−15	1.09−15	6.72−16	3.11−16
R	4	+1		9.05−14	6.29−14	3.79−14	2.49−14	1.56−14	7.64−15	4.32−15	4.75−15	6.38−15	4.34−15	1.55−15
R	5	+1		8.84−14	5.86−14	3.15−14	1.81−14	9.56−15	3.57−15	1.60−15	1.31−15	1.61−15	1.09−15	3.84−16
R	6	+1		8.04−16	6.71−16	5.99−16	6.03−16	6.29−16	6.38−16	6.03−16	5.26−16	3.80−16	2.27−16	1.08−16
R	7	+1		4.15−14	2.89−14	1.74−14	1.14−14	7.15−15	3.47−15	1.85−15	9.27−16	3.42−16	1.49−16	5.89−17
R	8	+1		5.57−14	3.69−14	1.98−14	1.14−14	5.99−15	2.23−15	9.62−16	4.01−16	1.36−16	5.97−17	2.15−17
R	9	+1		3.68−14	2.29−14	1.09−14	5.54−15	2.57−15	8.15−16	3.18−16	1.20−16	3.25−17	1.20−17	4.28−18
R	1	+2		1.22−12	8.62−13	6.74−13	6.96−13	5.60−13	3.01−13	1.74−13	1.01−13	4.66−14	2.21−14	9.23−15
R	2	+2		3.24−14	3.77−14	5.20−14	2.47−13	4.25−13	2.85−13	1.40−13	5.83−14	1.63−14	5.95−15	2.10−15
R	3	+2		6.47−16	1.34−14	8.08−13	1.81−12	1.61−12	7.08−13	3.01−13	1.17−13	3.12−14	1.12−14	3.96−15
R	4	+2		1.48−17	3.48−14	1.87−12	3.95−12	3.41−12	1.48−12	6.24−13	2.41−13	6.44−14	2.32−14	8.20−15
R	5	+2		2.44−16	3.55−14	2.31−12	5.63−12	5.24−12	2.37−12	1.02−12	3.96−13	1.06−13	3.83−14	1.35−14
R	6	+2		1.69−20	8.72−16	2.98−13	1.16−12	1.37−12	7.11−13	3.20−13	1.28−13	3.47−14	1.26−14	4.45−15
R	7	+2		2.89−21	8.32−17	5.41−14	2.64−13	3.47−13	1.93−13	8.86−14	3.57−14	9.78−15	3.55−15	1.26−15
R	8	+2		3.67−20	5.79−17	7.12−15	3.09−14	4.02−14	2.24−14	1.03−14	4.17−15	1.14−15	4.14−16	1.46−16
R	9	+2		1.01−22	2.28−17	2.05−14	1.11−13	1.53−13	8.78−14	4.08−14	1.65−14	4.53−15	1.65−15	5.83−16

(*continued on next page*)

Table 1 (*continued*)

Li+	0		3	1	43489.0(1S)	516797.0(3S)							
S	1	+1	7.98−09	2.02−08	5.88−08	9.08−08	1.18−07	1.21−07	1.13−07	1.05−07	9.26−08	8.00−08	6.61−08
S	1	+2	1.00−40	3.61−11	7.85−11	1.02−10	2.33−10	5.88−10	1.05−09	1.74−09	3.03−09	4.11−09	4.98−09
S	2	+1	6.25−08	6.42−08	8.85−08	1.12−07	1.46−07	1.98−07	2.28−07	2.41−07	2.27−07	2.00−07	1.67−07
S	3	+1	1.97−07	2.02−07	2.63−07	3.14−07	3.67−07	4.14−07	4.15−07	3.86−07	3.17−07	2.58−07	2.01−07
S	4	+1	2.66−07	2.69−07	3.10−07	3.58−07	4.27−07	5.20−07	5.58−07	5.52−07	4.87−07	4.14−07	3.38−07
S	5	+1	3.39−07	3.46−07	4.18−07	4.85−07	5.83−07	7.23−07	7.80−07	7.69−07	6.66−07	5.56−07	4.42−07
	−1												
	−1	−1											

Table 2
First stage collisional datafile for Li^{+}. See page 821 for Explanation of Tables

Li+ 1			3	2	610079.0(2S)
1	1S2		(1)0(0.0)	0.0	{1}2.00
2	1S1	2S1	(3)0(1.0)	476035.0	{1}1.00
3	1S1	2S1	(1)0(0.0)	491374.6	{1}1.00
4	1S1	2P1	(3)1(4.0)	494263.0	{1}1.00
5	1S1	2P1	(1)1(1.0)	501808.6	{1}1.00
6	1S1	3S1	(3)0(1.0)	554754.4	{1}1.00
7	1S1	3S1	(1)0(0.0)	558777.9	{1}1.00
8	1S1	3P1	(3)1(4.0)	559501.2	{1}1.00
9	1S1	3D1	(3)2(7.0)	561243.7	{1}1.00
10	1S1	3D1	(1)2(2.0)	561273.6	{1}1.00
11	1S1	3P1	(1)1(1.0)	561752.8	{1}1.00
12	1S1	4S1	(3)0(1.0)	579981.3	{1}1.00
13	1S1	4S1	(1)0(0.0)	581596.8	{1}1.00
14	1S1	4P1	(3)1(4.0)	581886.3	{1}1.00
15	1S1	4D1	(3)2(7.0)	582613.6	{1}1.00
16	1S1	4F1	(3)3(10.0)	582643.0	{1}1.00
17	1S1	4F1	(1)3(3.0)	582644.0	{1}1.00
18	1S1	4D1	(1)2(2.0)	582630.9	{1}1.00
19	1S1	4P1	(1)1(1.0)	582830.1	{1}1.00
−1					

2.0		3	4.00+03	8.00+03	2.00+04	4.00+04	8.00+04	2.00+05	4.00+05	8.00+05	2.00+06	4.00+06	8.00+06	2.00+07
2	1	1.00−30	1.36−01	1.39−01	1.17−01	9.11−02	6.83−02	4.60−02	3.35−02	2.36−02	1.38−02	8.75−03	5.33−03	2.65−03
3	1	1.00−30	4.76−02	4.68−02	4.23−02	3.93−02	3.69−02	3.58−02	3.77−02	4.29−02	5.43−02	6.42−02	7.33−02	8.27−02
4	1	1.70+03	8.15−02	8.45−02	8.53−02	8.51−02	8.32−02	7.62−02	6.65−02	5.33−02	3.49−02	2.33−02	1.47−02	7.56−03
5	1	2.65+10	3.34−02	3.47−02	3.82−02	4.33−02	5.27−02	8.12−02	1.25−01	1.92−01	3.26−01	4.65−01	6.40−01	9.17−01
6	1	1.00−30	2.62−02	2.26−02	1.81−02	1.51−02	1.26−02	9.52−03	7.34−03	5.32−03	3.16−03	2.00−03	1.22−03	6.08−04
7	1	1.00−30	9.01−03	8.46−03	7.88−03	7.38−03	7.00−03	6.93−03	7.47−03	8.80−03	1.17−02	1.43−02	1.67−02	1.93−02
8	1	5.67+02	1.24−02	1.36−02	1.48−02	1.53−02	1.56−02	1.55−02	1.44−02	1.21−02	8.22−03	5.57−03	3.56−03	1.85−03
9	1	1.05+00	4.53−03	4.83−03	5.05−03	4.70−03	4.16−03	3.35−03	2.67−03	1.97−03	1.18−03	7.47−04	4.55−04	2.26−04
10	1	6.76+04	6.10−03	6.43−03	6.28−03	5.66−03	5.00−03	4.46−03	4.40−03	4.65−03	5.33−03	5.94−03	6.53−03	7.13−03
11	1	8.57+09	4.22−03	5.01−03	6.19−03	7.46−03	9.80−03	1.67−02	2.67−02	4.17−02	7.11−02	1.02−01	1.41−01	2.04−01
12	1	1.00−30	6.23−03	6.14−03	5.57−03	5.02−03	4.45−03	3.58−03	2.83−03	2.07−03	1.24−03	7.84−04	4.78−04	2.37−04
13	1	1.00−30	3.01−03	3.00−03	2.81−03	2.63−03	2.51−03	2.53−03	2.77−03	3.36−03	4.68−03	5.87−03	7.00−03	8.19−03
14	1	2.48+02	5.28−03	5.32−03	5.29−03	5.34−03	5.47−03	5.57−03	5.26−03	4.48−03	3.07−03	2.09−03	1.33−03	6.93−04
15	1	1.64−12	2.33−03	2.32−03	2.20−03	2.08−03	1.95−03	1.71−03	1.42−03	1.08−03	6.60−04	4.24−04	2.61−04	1.31−04
16	1	1.00−30	1.41−03	1.43−03	1.17−03	8.67−04	5.97−04	3.38−04	2.08−04	1.22−04	5.69−05	3.08−05	1.63−05	6.86−06
17	1	1.00−30	1.55−03	1.48−03	1.16−03	8.48−04	5.86−04	3.49−04	2.35−04	1.63−04	1.08−04	8.43−05	6.97−05	5.84−05
18	1	1.14+05	3.28−03	3.03−03	2.68−03	2.43−03	2.27−03	2.21−03	2.30−03	2.49−03	2.87−03	3.18−03	3.47−03	3.77−03
19	1	4.54+09	1.71−03	1.83−03	2.17−03	2.62−03	3.50−03	6.17−03	1.02−02	1.65−02	2.96−02	4.38−02	6.21−02	9.17−02
3	2	1.00−30	1.51+00	1.37+00	1.10+00	8.95−01	6.92−01	4.54−01	3.15−01	2.11−01	1.18−01	7.25−02	4.33−02	2.12−02
4	2	2.76+07	2.65+01	2.80+01	3.19+01	3.70+01	4.46+01	5.91+01	7.32+01	8.88+01	1.10+02	1.25+02	1.41+02	1.62+02
5	2	9.20+00	6.94−01	6.87−01	6.99−01	6.87−01	5.96−01	4.08−01	2.75−01	1.72−01	8.52−02	4.78−02	2.60−02	1.13−02
6	2	7.76−27	2.23+00	1.95+00	1.58+00	1.42+00	1.38+00	1.50+00	1.66+00	1.82+00	1.98+00	2.06+00	2.11+00	2.15+00
7	2	1.00−30	2.49−01	1.96−01	1.38−01	1.01−01	7.01−02	4.02−02	2.50−02	1.50−02	7.29−03	4.12−03	2.29−03	1.03−03
8	2	2.45+08	9.14−01	8.97−01	8.65−01	8.38−01	8.66−01	1.13+00	1.62+00	2.37+00	3.74+00	4.98+00	6.35+00	8.30+00
9	2	8.23+03	1.03+00	1.12+00	1.28+00	1.44+00	1.74+00	2.46+00	3.23+00	4.05+00	4.99+00	5.52+00	5.89+00	6.19+00
10	2	3.84−01	2.54−01	2.61−01	2.49−01	2.16−01	1.72−01	1.13−01	7.60−02	4.77−02	2.37−02	1.33−02	7.28−03	3.17−03
11	2	4.05+01	1.02−01	1.14−01	1.18−01	1.06−01	8.67−02	5.88−02	3.98−02	2.50−02	1.23−02	6.81−03	3.66−03	1.56−03
12	2	7.37−28	3.63−01	3.28−01	2.76−01	2.51−01	2.48−01	2.74−01	3.06−01	3.35−01	3.61−01	3.71−01	3.77−01	3.80−01
13	2	1.00−30	5.15−02	4.51−02	3.49−02	2.71−02	1.99−02	1.21−02	7.67−03	4.63−03	2.23−03	1.24−03	6.78−04	2.97−04
14	2	4.27+07	3.17−01	3.12−01	2.96−01	2.88−01	2.96−01	3.65−01	4.76−01	6.13−01	7.94−01	9.27−01	1.06+00	1.23+00
15	2	1.12+03	2.37−01	2.49−01	2.56−01	2.71−01	3.13−01	4.36−01	5.85−01	7.58−01	9.72−01	1.10+00	1.19+00	1.27+00
16	2	1.00−30	2.28−01	2.48−01	2.41−01	2.31−01	2.31−01	2.51−01	2.71−01	2.84−01	2.89−01	2.86−01	2.83−01	2.78−01
17	2	1.00−30	6.57−02	6.45−02	5.33−02	4.15−02	3.03−02	1.82−02	1.16−02	6.96−03	3.28−03	1.78−03	9.39−04	3.93−04
18	2	2.45−12	1.02−01	9.40−02	7.83−02	6.51−02	5.18−02	3.50−02	2.40−02	1.54−02	7.85−03	4.50−03	2.51−03	1.12−03
19	2	1.01+01	4.39−02	4.61−02	4.42−02	3.92−02	3.22−02	2.19−02	1.49−02	9.39−03	4.63−03	2.57−03	1.39−03	5.93−04
4	3	7.29−03	1.98+00	1.96+00	1.57+00	1.26+00	9.50−01	5.82−01	3.69−01	2.21−01	1.05−01	5.73−02	3.06−02	1.31−02
5	3	5.23+06	1.40+01	1.50+01	1.76+01	2.06+01	2.48+01	3.22+01	3.90+01	4.62+01	5.54+01	6.22+01	6.88+01	7.74+01
6	3	1.00−30	6.73−01	5.39−01	3.38−01	2.19−01	1.36−01	7.01−02	4.16−02	2.45−02	1.19−02	6.78−03	3.82−03	1.76−03
7	3	1.00−30	5.01−01	4.37−01	4.02−01	4.15−01	4.66−01	5.86−01	7.02−01	8.23−01	9.69−01	1.05+00	1.12+00	1.17+00
8	3	1.51+01	3.89−01	3.53−01	2.96−01	2.38−01	1.77−01	1.07−01	6.77−02	4.03−02	1.89−02	1.02−02	5.38−03	2.26−03
9	3	8.63−02	2.78−01	2.81−01	2.76−01	2.48−01	2.03−01	1.37−01	9.24−02	5.80−02	2.88−02	1.62−02	8.80−03	3.82−03
10	3	5.57+03	5.44−01	5.71−01	6.42−01	7.48−01	9.46−01	1.39+00	1.84+00	2.28+00	2.76+00	3.02+00	3.19+00	3.33+00
11	3	2.76+08	2.21−01	2.44−01	2.84−01	3.29−01	4.16−01	6.86−01	1.08+00	1.66+00	2.67+00	3.58+00	4.56+00	5.95+00
12	3	1.00−30	1.00−01	8.34−02	5.86−02	4.21−02	2.90−02	1.64−02	1.02−02	6.14−03	3.02−03	1.72−03	9.70−04	4.45−04

(*continued on next page*)

Table 2 (*continued*)

Li+	1			3	2	610079.0(2S)									
	13	3	1.00−30	6.74−02	6.58−02	6.41−02	6.70−02	7.70−02	1.02−01	1.28−01	1.59−01	2.03−01	2.31−01	2.53−01	2.71−01
	14	3	9.39+00	1.16−01	1.08−01	9.09−02	7.37−02	5.58−02	3.45−02	2.21−02	1.33−02	6.28−03	3.43−03	1.82−03	7.70−04
	15	3	3.14−14	7.96−02	8.09−02	7.43−02	6.56−02	5.47−02	3.83−02	2.65−02	1.70−02	8.63−03	4.92−03	2.73−03	1.21−03
	16	3	1.00−30	6.46−02	6.98−02	6.25−02	5.11−02	3.89−02	2.44−02	1.59−02	9.69−03	4.64−03	2.54−03	1.35−03	5.69−04
	17	3	1.00−30	1.04−01	1.08−01	1.07−01	1.09−01	1.21−01	1.51−01	1.76−01	1.94−01	2.05−01	2.07−01	2.08−01	2.07−01
	18	3	3.32+03	1.17−01	1.17−01	1.11−01	1.13−01	1.31−01	1.83−01	2.43−01	3.08−01	3.85−01	4.29−01	4.61−01	4.87−01
	19	3	1.85+08	6.00−02	6.69−02	7.90−02	9.29−02	1.16−01	1.76−01	2.65−01	4.07−01	6.78−01	9.36−01	1.23+00	1.64+00
	5	4	1.79−06	3.76+00	3.69+00	3.59+00	3.42+00	2.96+00	2.09+00	1.48+00	9.82−01	5.34−01	3.23−01	1.90−01	9.12−02
	6	4	2.48+08	5.18+00	4.27+00	2.93+00	2.22+00	1.87+00	1.97+00	2.45+00	3.21+00	4.55+00	5.74+00	7.04+00	8.86+00
	7	4	5.19+01	9.00−01	7.01−01	4.95−01	3.65−01	2.56−01	1.47−01	9.03−02	5.26−02	2.40−02	1.28−02	6.69−03	2.77−03
	8	4	1.47+03	7.41+00	6.97+00	6.47+00	6.11+00	5.96+00	6.34+00	7.03+00	7.83+00	8.76+00	9.27+00	9.62+00	9.90+00
	9	4	1.13+09	8.46+00	9.11+00	1.05+01	1.23+01	1.57+01	2.52+01	3.70+01	5.24+01	7.66+01	9.72+01	1.19+02	1.49+02
	10	4	5.04+04	1.06+00	1.09+00	1.05+00	9.16−01	7.36−01	4.86−01	3.23−01	2.00−01	9.67−02	5.33−02	2.86−02	1.22−02
	11	4	1.14−03	5.86−01	6.16−01	6.02−01	5.24−01	4.16−01	2.72−01	1.81−01	1.13−01	5.62−02	3.15−02	1.72−02	7.46−03
	12	4	3.89+07	1.06+00	8.68−01	6.45−01	5.18−01	4.39−01	4.15−01	4.51−01	5.11−01	6.02−01	6.75−01	7.50−01	8.52−01
	13	4	3.57+01	2.13−01	1.98−01	1.58−01	1.23−01	8.95−02	5.34−02	3.34−02	1.96−02	9.04−03	4.83−03	2.52−03	1.05−03
	14	4	4.25+02	1.84+00	1.78+00	1.60+00	1.46+00	1.35+00	1.33+00	1.41+00	1.52+00	1.63+00	1.69+00	1.72+00	1.75+00
	15	4	3.48+08	1.64+00	1.82+00	2.02+00	2.30+00	2.87+00	4.44+00	6.36+00	8.69+00	1.22+01	1.50+01	1.79+01	2.20+01
	16	4	1.11+03	1.53+00	1.65+00	1.59+00	1.51+00	1.50+00	1.64+00	1.81+00	1.99+00	2.16+00	2.24+00	2.30+00	2.33+00
	17	4	1.00−30	2.51−01	2.50−01	2.07−01	1.61−01	1.16−01	6.93−02	4.35−02	2.56−02	1.19−02	6.37−03	3.34−03	1.39−03
	18	4	7.45+01	3.86−01	3.71−01	3.18−01	2.67−01	2.14−01	1.46−01	9.92−02	6.27−02	3.11−02	1.74−02	9.47−03	4.09−03
	19	4	7.61−04	2.04−01	2.18−01	2.11−01	1.86−01	1.50−01	9.92−02	6.63−02	4.15−02	2.05−02	1.15−02	6.27−03	2.73−03
	6	5	9.90+00	2.11+00	1.65+00	1.03+00	6.81−01	4.35−01	2.28−01	1.34−01	7.58−02	3.38−02	1.78−02	9.20−03	3.78−03
	7	5	2.06+08	1.04+00	7.90−01	5.69−01	4.77−01	4.53−01	5.53−01	7.46−01	1.04+00	1.53+00	1.97+00	2.45+00	3.12+00
	8	5	1.90−04	1.81+00	1.51+00	1.17+00	9.13−01	6.65−01	3.97−01	2.52−01	1.52−01	7.34−02	4.08−02	2.22−02	9.69−03
	9	5	1.59+04	1.33+00	1.32+00	1.28+00	1.14+00	9.25−01	6.17−01	4.10−01	2.53−01	1.22−01	6.72−02	3.59−02	1.53−02
	10	5	9.88+08	3.98+00	4.27+00	4.92+00	5.88+00	7.78+00	1.28+01	1.89+01	2.66+01	3.85+01	4.84+01	5.88+01	7.32+01
	11	5	1.86+03	1.11+00	1.17+00	1.27+00	1.36+00	1.56+00	2.04+00	2.55+00	3.11+00	3.76+00	4.13+00	4.40+00	4.61+00
	12	5	3.25+00	3.30−01	2.81−01	2.06−01	1.52−01	1.06−01	6.12−02	3.76−02	2.18−02	9.93−03	5.28−03	2.75−03	1.13−03
	13	5	1.15+08	1.56−01	1.44−01	1.25−01	1.14−01	1.09−01	1.18−01	1.42−01	1.83−01	2.67−01	3.48−01	4.39−01	5.69−01
	14	5	1.25−04	4.59−01	4.19−01	3.46−01	2.80−01	2.11−01	1.30−01	8.36−02	5.05−02	2.43−02	1.35−02	7.32−03	3.18−03
	15	5	1.60+01	3.44−01	3.57−01	3.32−01	2.93−01	2.43−01	1.68−01	1.15−01	7.27−02	3.60−02	2.01−02	1.09−02	4.67−03
	16	5	1.55−04	2.44−01	2.59−01	2.28−01	1.85−01	1.40−01	8.65−02	5.52−02	3.29−02	1.54−02	8.27−03	4.35−03	1.81−03
	17	5	3.36+02	6.91−01	7.16−01	6.85−01	6.72−01	7.06−01	8.38−01	9.77−01	1.11+00	1.23+00	1.29+00	1.32+00	1.35+00
	18	5	3.27+08	6.80−01	7.27−01	7.87−01	9.03−01	1.16+00	1.82+00	2.60+00	3.57+00	5.06+00	6.30+00	7.62+00	9.45+00
	19	5	2.66+03	2.46−01	2.67−01	2.77−01	2.87−01	3.15−01	3.98−01	4.99−01	6.25−01	7.92−01	8.96−01	9.73−01	1.04+00
	7	6	1.00−30	2.54+00	1.98+00	1.36+00	9.64−01	6.55−01	3.87−01	2.61−01	1.74−01	9.74−02	6.03−02	3.61−02	1.77−02
	8	6	2.81+06	8.95+01	1.11+02	1.65+02	2.30+02	3.19+02	4.67+02	5.92+02	7.17+02	8.71+02	9.80+02	1.09+03	1.22+03
	9	6	2.98−01	4.47+01	4.52+01	4.38+01	4.16+01	3.95+01	3.83+01	3.86+01	3.90+01	3.93+01	3.93+01	3.93+01	3.92+01
	10	6	1.43−05	1.98+00	2.08+00	1.89+00	1.47+00	1.01+00	5.50−01	3.23−01	1.80−01	7.90−02	4.11−02	2.10−02	8.55−03
	11	6	1.10+00	6.67−01	8.10−01	8.18−01	6.74−01	4.92−01	2.89−01	1.80−01	1.07−01	4.95−02	2.66−02	1.40−02	5.81−03
	12	6	1.00−30	6.59+00	5.89+00	5.31+00	5.37+00	5.96+00	7.34+00	8.45+00	9.31+00	1.00+01	1.03+01	1.04+01	1.05+01
	13	6	1.00−30	4.06−01	2.96−01	1.84−01	1.21−01	7.72−02	4.08−02	2.47−02	1.47−02	7.19−03	4.11−03	2.32−03	1.07−03
	14	6	2.18+07	3.67+00	3.36+00	2.97+00	2.80+00	2.98+00	4.29+00	6.34+00	9.17+00	1.38+01	1.76+01	2.17+01	2.72+01
	15	6	3.78+02	3.66+00	3.91+00	4.29+00	4.93+00	6.16+00	8.60+00	1.05+01	1.20+01	1.32+01	1.37+01	1.39+01	1.40+01
	16	6	1.00−30	4.92+00	5.41+00	5.96+00	6.58+00	7.59+00	9.41+00	1.07+01	1.17+01	1.24+01	1.27+01	1.28+01	1.29+01
	17	6	1.00−30	9.39−01	9.04−01	7.35−01	5.64−01	4.01−01	2.29−01	1.38−01	7.87−02	3.48−02	1.82−02	9.31−03	3.79−03
	18	6	8.66−14	7.37−01	6.55−01	4.85−01	3.49−01	2.33−01	1.24−01	7.16−02	3.95−02	1.71−02	8.82−03	4.50−03	1.83−03
	19	6	2.67+00	2.19−01	2.14−01	1.76−01	1.33−01	9.33−02	5.24−02	3.15−02	1.80−02	8.15−03	4.33−03	2.26−03	9.39−04
	8	7	2.94−04	2.49+00	2.00+00	1.49+00	1.10+00	7.38−01	3.97−01	2.36−01	1.34−01	6.04−02	3.20−02	1.66−02	6.84−03
	9	7	3.02−08	2.16+00	2.12+00	1.86+00	1.44+00	9.90−01	5.35−01	3.12−01	1.73−01	7.54−02	3.90−02	1.99−02	8.08−03
	10	7	2.10−03	1.61+01	1.46+01	1.31+01	1.22+01	1.17+01	1.16+01	1.18+01	1.20+01	1.22+01	1.23+01	1.23+01	1.24+01
	11	7	7.27+05	4.72+01	6.01+01	8.74+01	1.17+02	1.54+02	2.13+02	2.62+02	3.09+02	3.67+02	4.08+02	4.47+02	4.97+02
	12	7	1.00−30	1.03+00	7.09−01	3.86−01	2.30−01	1.33−01	6.37−02	3.64−02	2.08−02	9.85−03	5.54−03	3.09−03	1.41−03
	13	7	1.00−30	1.39+00	1.41+00	1.52+00	1.77+00	2.20+00	3.00+00	3.66+00	4.29+00	4.97+00	5.35+00	5.60+00	5.81+00
	14	7	1.45+00	6.95−01	5.48−01	3.70−01	2.55−01	1.66−01	8.67−02	5.00−02	2.77−02	1.21−02	6.37−03	3.31−03	1.37−03
	15	7	4.78−15	5.71−01	5.54−01	4.46−01	3.35−01	2.32−01	1.26−01	7.34−02	4.06−02	1.76−02	9.09−03	4.64−03	1.89−03
	16	7	1.00−30	9.58−01	9.57−01	8.00−01	6.23−01	4.47−01	2.55−01	1.54−01	8.70−02	3.83−02	1.99−02	1.02−02	4.13−03
	17	7	1.00−30	1.59+00	1.72+00	1.98+00	2.33+00	2.86+00	3.74+00	4.35+00	4.79+00	5.11+00	5.22+00	5.28+00	5.31+00
	18	7	3.72+02	1.55+00	1.80+00	2.23+00	2.79+00	3.68+00	5.31+00	6.58+00	7.59+00	8.40+00	8.73+00	8.90+00	9.02+00
	19	7	3.88+07	6.68−01	7.46−01	8.64−01	1.04+00	1.47+00	2.87+00	4.79+00	7.40+00	1.16+01	1.50+01	1.87+01	2.37+01
	9	8	1.67+05	3.64+02	4.24+02	5.39+02	6.57+02	8.03+02	1.03+03	1.22+03	1.41+03	1.63+03	1.79+03	1.94+03	2.14+03
	10	8	4.84+00	6.43+00	6.68+00	6.11+00	4.80+00	3.34+00	1.81+00	1.07+00	5.99−01	2.65−01	1.39−01	7.18−02	2.94−02
	11	8	4.59−08	2.82+00	3.15+00	3.25+00	2.80+00	2.14+00	1.35+00	9.13−01	6.04−01	3.32−01	2.03−01	1.21−01	5.88−02
	12	8	6.10+07	1.05+01	8.14+00	6.32+00	6.14+00	7.30+00	1.16+01	1.72+01	2.42+01	3.50+01	4.37+01	5.28+01	6.50+01
	13	8	1.28+01	8.76−01	6.69−01	4.47−01	3.06−01	1.96−01	9.99−02	5.69−02	3.12−02	1.35−02	7.02−03	3.60−03	1.47−03
	14	8	1.75+02	1.60+01	1.52+01	1.54+01	1.74+01	2.13+01	2.86+01	3.41+01	3.86+01	4.26+01	4.45+01	4.56+01	4.64+01
	15	8	1.02+08	1.75+01	1.84+01	1.96+01	2.30+01	3.19+01	5.89+01	9.28+01	1.35+02	1.98+02	2.49+02	3.02+02	3.72+02

Table 2 (*continued*)

Li+	1			3	2	610079.0(2S)									
	16	8	5.04+02	1.76+01	1.99+01	2.34+01	2.83+01	3.69+01	5.48+01	7.02+01	8.33+01	9.48+01	9.97+01	1.03+02	1.05+02
	17	8	8.58−05	2.17+00	2.19+00	1.83+00	1.42+00	1.01+00	5.80−01	3.54−01	2.04−01	9.13−02	4.80−02	2.47−02	1.01−02
	18	8	2.24+01	2.24+00	2.10+00	1.61+00	1.17+00	7.81−01	4.15−01	2.41−01	1.33−01	5.80−02	3.01−02	1.54−02	6.26−03
	19	8	9.55−05	7.61−01	7.82−01	6.76−01	5.31−01	3.79−01	2.16−01	1.31−01	7.70−02	3.63−02	2.00−02	1.08−02	4.73−03
	10	9	1.00−30	1.19+01	1.24+01	1.21+01	1.01+01	7.52+00	4.54+00	2.94+00	1.84+00	9.44−01	5.54−01	3.19−01	1.50−01
	11	9	5.23−02	4.52+00	4.77+00	4.53+00	3.66+00	2.60+00	1.45+00	8.63−01	4.89−01	2.17−01	1.14−01	5.88−02	2.41−02
	12	9	8.42+01	1.78+01	1.25+01	7.52+00	5.24+00	4.06+00	3.66+00	3.79+00	3.96+00	4.10+00	4.14+00	4.14+00	4.14+00
	13	9	4.17−03	1.73+00	1.32+00	8.60−01	5.80−01	3.68−01	1.86−01	1.05−01	5.68−02	2.42−02	1.25−02	6.34−03	2.57−03
	14	9	9.34+06	2.58+01	2.20+01	1.76+01	1.51+01	1.35+01	1.33+01	1.45+01	1.68+01	2.11+01	2.48+01	2.89+01	3.45+01
	15	9	7.80+01	3.17+01	3.21+01	3.20+01	3.39+01	3.90+01	4.96+01	5.82+01	6.56+01	7.25+01	7.58+01	7.79+01	7.95+01
	16	9	2.21+08	6.61+01	7.50+01	9.29+01	1.22+02	1.79+02	3.22+02	4.84+02	6.74+02	9.43+02	1.15+03	1.36+03	1.64+03
	17	9	1.06+04	4.93+00	5.13+00	4.45+00	3.54+00	2.58+00	1.49+00	9.07−01	5.18−01	2.31−01	1.21−01	6.26−02	2.56−02
	18	9	3.69−03	4.26+00	4.08+00	3.21+00	2.37+00	1.62+00	8.83−01	5.25−01	2.98−01	1.34−01	7.15−02	3.74−02	1.56−02
	19	9	2.17+02	1.73+00	1.71+00	1.41+00	1.07+00	7.49−01	4.09−01	2.39−01	1.33−01	5.80−02	3.01−02	1.54−02	6.28−03
	11	10	1.69+04	1.50+02	1.86+02	2.45+02	2.98+02	3.56+02	4.40+02	5.04+02	5.65+02	6.38+02	6.89+02	7.38+02	8.00+02
	12	10	1.30−03	3.51+00	2.50+00	1.46+00	9.13−01	5.49−01	2.63−01	1.45−01	7.72−02	3.25−02	1.67−02	8.45−03	3.42−03
	13	10	8.87+01	2.17+00	1.70+00	1.22+00	9.84−01	8.72−01	8.74−01	9.18−01	9.50−01	9.59−01	9.53−01	9.43−01	9.33−01
	14	10	1.28+02	4.35+00	3.40+00	2.32+00	1.61+00	1.05+00	5.46−01	3.12−01	1.71−01	7.35−02	3.80−02	1.94−02	7.89−03
	15	10	1.20−03	3.92+00	3.78+00	3.01+00	2.25+00	1.54+00	8.51−01	5.08−01	2.90−01	1.31−01	6.98−02	3.65−02	1.52−02
	16	10	3.51+03	5.15+00	5.39+00	4.70+00	3.74+00	2.73+00	1.58+00	9.54−01	5.44−01	2.42−01	1.27−01	6.53−02	2.67−02
	17	10	2.21+08	2.16+01	2.44+01	3.07+01	4.10+01	6.07+01	1.09+02	1.64+02	2.28+02	3.18+02	3.88+02	4.59+02	5.53+02
	18	10	7.86+01	8.89+00	9.09+00	9.35+00	1.03+01	1.24+01	1.64+01	1.95+01	2.20+01	2.44+01	2.55+01	2.62+01	2.67+01
	19	10	4.33+06	3.62+00	3.73+00	3.54+00	3.31+00	3.15+00	3.14+00	3.30+00	3.60+00	4.16+00	4.65+00	5.19+00	5.92+00
	12	11	2.27+00	1.76+00	1.25+00	7.33−01	4.64−01	2.83−01	1.39−01	7.79−02	4.24−02	1.83−02	9.47−03	4.85−03	1.98−03
	13	11	6.02+07	1.70+00	1.44+00	1.39+00	1.59+00	2.14+00	3.79+00	5.86+00	8.52+00	1.26+01	1.59+01	1.94+01	2.40+01
	14	11	1.54−05	1.96+00	1.54+00	1.07+00	7.57−01	5.05−01	2.73−01	1.63−01	9.38−02	4.37−02	2.40−02	1.30−02	5.69−03
	15	11	3.87+00	1.66+00	1.63+00	1.34+00	1.02+00	7.07−01	3.90−01	2.30−01	1.29−01	5.66−02	2.95−02	1.52−02	6.18−03
	16	11	1.47−05	1.90+00	1.98+00	1.71+00	1.35+00	9.79−01	5.76−01	3.55−01	2.05−01	9.22−02	4.84−02	2.49−02	1.01−02
	17	11	8.74−12	5.40+00	5.70+00	6.63+00	8.47+00	1.20+01	1.95+01	2.60+01	3.15+01	3.63+01	3.84+01	3.96+01	4.04+01
	18	11	1.16+08	6.23+00	7.26+00	9.23+00	1.24+01	1.88+01	3.59+01	5.61+01	8.07+01	1.17+02	1.46+02	1.75+02	2.15+02
	19	11	2.11+02	1.74+00	2.14+00	3.16+00	4.59+00	6.73+00	1.04+01	1.34+01	1.62+01	1.92+01	2.08+01	2.19+01	2.27+01
	13	12	1.00−30	1.69+00	1.37+00	9.25−01	6.28−01	4.12−01	2.41−01	1.67−01	1.16−01	6.86−02	4.37−02	2.68−02	1.34−02
	14	12	6.22+05	1.90+02	2.91+02	5.46+02	8.56+02	1.26+03	1.90+03	2.41+03	2.90+03	3.48+03	3.88+03	4.26+03	4.75+03
	15	12	4.49−02	1.31+02	1.44+02	1.56+02	1.63+02	1.67+02	1.71+02	1.73+02	1.72+02	1.71+02	1.70+02	1.69+02	1.69+02
	16	12	1.00−30	4.47+01	4.23+01	3.59+01	3.06+01	2.68+01	2.45+01	2.41+01	2.41+01	2.40+01	2.40+01	2.39+01	2.38+01
	17	12	1.00−30	3.47+00	3.14+00	2.25+00	1.53+00	9.61−01	4.70−01	2.58−01	1.37−01	5.69−02	2.89−02	1.46−02	5.86−03
	18	12	1.16−18	3.29+00	2.83+00	1.99+00	1.36+00	8.58−01	4.28−01	2.39−01	1.29−01	5.48−02	2.81−02	1.43−02	5.79−03
	19	12	1.81−01	1.52+00	1.32+00	9.83−01	7.12−01	4.83−01	2.67−01	1.61−01	9.40−02	4.42−02	2.44−02	1.32−02	5.77−03
	14	13	6.81−07	3.03+00	2.36+00	1.54+00	1.03+00	6.53−01	3.36−01	1.96−01	1.11−01	5.12−02	2.79−02	1.50−02	6.48−03
	15	13	4.51−22	2.29+00	2.17+00	1.65+00	1.17+00	7.56−01	3.83−01	2.16−01	1.17−01	4.98−02	2.56−02	1.30−02	5.26−03
	16	13	1.00−30	2.95+00	2.85+00	2.13+00	1.46+00	9.13−01	4.44−01	2.43−01	1.28−01	5.34−02	2.71−02	1.37−02	5.49−03
	17	13	1.00−30	1.12+01	1.04+01	8.86+00	7.75+00	7.07+00	6.85+00	6.91+00	6.98+00	7.02+00	7.01+00	7.00+00	6.98+00
	18	13	9.87−05	3.26+01	3.59+01	4.00+01	4.28+01	4.53+01	4.84+01	5.03+01	5.17+01	5.26+01	5.29+01	5.30+01	5.30+01
	19	13	1.64+05	1.12+02	1.67+02	2.80+02	4.00+02	5.45+02	7.62+02	9.31+02	1.09+03	1.28+03	1.41+03	1.53+03	1.69+03
	15	14	4.75+04	1.01+03	1.36+03	2.06+03	2.77+03	3.60+03	4.80+03	5.72+03	6.57+03	7.57+03	8.26+03	8.92+03	9.76+03
	16	14	1.09−04	1.96+02	2.05+02	2.00+02	1.91+02	1.84+02	1.80+02	1.78+02	1.77+02	1.73+02	1.71+02	1.70+02	1.68+02
	17	14	8.74−12	9.29+00	8.60+00	6.28+00	4.33+00	2.77+00	1.39+00	7.73−01	4.14−01	1.74−01	8.86−02	4.48−02	1.80−02
	18	14	2.88−03	6.94+00	6.69+00	5.15+00	3.67+00	2.40+00	1.24+00	7.12−01	3.95−01	1.75−01	9.25−02	4.83−02	2.02−02
	19	14	2.77−09	3.72+00	3.65+00	2.89+00	2.13+00	1.48+00	8.86−01	6.03−01	4.07−01	2.32−01	1.45−01	8.78−02	4.34−02
	16	15	1.09+01	4.31+03	5.11+03	6.25+03	7.12+03	8.00+03	9.13+03	9.95+03	1.07+04	1.16+04	1.21+04	1.27+04	1.34+04
	17	15	5.16−15	1.54+01	1.52+01	1.18+01	8.33+00	5.38+00	2.73+00	1.54+00	8.35−01	3.58−01	1.84−01	9.40−02	3.82−02
	18	15	1.00−30	1.18+01	1.19+01	9.70+00	7.12+00	4.77+00	2.62+00	1.64+00	1.03+00	5.38−01	3.22−01	1.88−01	9.02−02
	19	15	1.51−04	4.73+00	4.78+00	3.92+00	2.91+00	1.97+00	1.05+00	6.11−01	3.42−01	1.52−01	8.08−02	4.23−02	1.77−02
	18	16	1.00−30	1.50+01	1.53+01	1.20+01	8.50+00	5.48+00	2.77+00	1.56+00	8.47−01	3.62−01	1.87−01	9.51−02	3.86−02
	19	16	1.83−16	6.44+00	6.33+00	4.97+00	3.59+00	2.37+00	1.22+00	6.88−01	3.70−01	1.56−01	7.95−02	4.02−02	1.62−02
	17	16	1.00−30	2.72+01	2.81+01	2.28+01	1.68+01	1.14+01	6.30+00	3.87+00	2.32+00	1.15+00	6.64−01	3.77−01	1.75−01
	18	17	1.00−30	1.63+03	1.95+03	2.38+03	2.69+03	2.99+03	3.38+03	3.66+03	3.91+03	4.19+03	4.39+03	4.58+03	4.81+03
	19	17	1.78−09	5.78+01	6.20+01	6.32+01	6.14+01	5.93+01	5.71+01	5.58+01	5.44+01	5.26+01	5.16+01	5.09+01	5.03+01
	19	18	5.39+03	4.98+02	6.88+02	1.00+03	1.28+03	1.58+03	1.98+03	2.28+03	2.55+03	2.87+03	3.09+03	3.30+03	3.56+03
S	1	+1		1.76−10	1.65−10	5.56−10	8.99−10	1.33−09	2.17−09	3.04−09	4.02−09	5.09−09	5.47−09	5.40−09	4.79−09
S	2	+1		1.32−08	9.60−09	1.26−08	1.54−08	1.86−08	2.23−08	2.38−08	2.37−08	2.13−08	1.85−08	1.54−08	1.15−08
S	3	+1		1.35−08	9.73−09	1.25−08	1.52−08	1.81−08	2.13−08	2.25−08	2.21−08	1.96−08	1.69−08	1.39−08	1.04−08
S	4	+1		1.15−08	1.23−08	1.96−08	2.52−08	3.05−08	3.54−08	3.64−08	3.48−08	2.99−08	2.51−08	2.03−08	1.47−08
S	5	+1		1.15−08	1.23−08	1.95−08	2.49−08	2.99−08	3.44−08	3.51−08	3.34−08	2.85−08	2.38−08	1.92−08	1.39−08
S	6	+1		6.77−08	6.24−08	7.76−08	8.51−08	8.81−08	8.48−08	7.76−08	6.78−08	5.36−08	4.32−08	3.41−08	2.43−08
S	7	+1		6.71−08	6.18−08	7.59−08	8.26−08	8.49−08	8.10−08	7.37−08	6.42−08	5.04−08	4.06−08	3.19−08	2.27−08

(*continued on next page*)

Table 2 (*continued*)

Li+	1		3	2	610079.0(2S)								
S	8	+1	9.89−08	9.78−08	1.27−07	1.40−07	1.43−07	1.32−07	1.15−07	9.59−08	7.06−08	5.43−08	4.10−08	2.77−08
S	9	+1	8.24−08	8.91−08	1.23−07	1.39−07	1.45−07	1.35−07	1.19−07	9.86−08	7.26−08	5.58−08	4.21−08	2.85−08
S	10	+1	8.24−08	8.92−08	1.23−07	1.39−07	1.45−07	1.35−07	1.19−07	9.85−08	7.26−08	5.58−08	4.21−08	2.84−08
S	11	+1	9.84−08	9.73−08	1.26−07	1.38−07	1.40−07	1.28−07	1.12−07	9.24−08	6.79−08	5.21−08	3.93−08	2.65−08
S	12	+1	1.52−07	1.49−07	1.74−07	1.76−07	1.61−07	1.27−07	9.93−08	7.56−08	5.22−08	3.97−08	3.05−08	2.16−08
S	13	+1	1.50−07	1.47−07	1.71−07	1.71−07	1.55−07	1.21−07	9.46−08	7.19−08	4.97−08	3.78−08	2.90−08	2.06−08
S	14	+1	1.92−07	1.93−07	2.27−07	2.33−07	2.23−07	1.91−07	1.61−07	1.31−07	9.70−08	7.60−08	5.89−08	4.15−08
S	15	+1	2.32−07	2.42−07	2.86−07	2.84−07	2.57−07	1.99−07	1.54−07	1.16−07	7.86−08	5.85−08	4.38−08	2.99−08
S	16	+1	5.60−07	7.32−07	7.22−06	1.42−05	1.76−05	1.64−05	1.35−05	1.06−05	7.22−06	5.32−06	3.88−06	2.55−06
S	17	+1	5.60−07	7.32−07	7.22−06	1.42−05	1.76−05	1.64−05	1.35−05	1.06−05	7.22−06	5.32−06	3.88−06	2.55−06
S	18	+1	2.32−07	2.42−07	2.86−07	2.84−07	2.57−07	1.99−07	1.54−07	1.16−07	7.86−08	5.85−08	4.37−08	2.99−08
S	19	+1	1.91−07	1.91−07	2.24−07	2.29−07	2.18−07	1.86−07	1.56−07	1.28−07	9.43−08	7.38−08	5.71−08	4.03−08
R	1	+1	4.30−13	3.04−13	1.91−13	1.35−13	9.42−14	5.75−14	3.83−14	2.43−14	1.17−14	6.05−15	2.86−15	9.63−16
R	2	+1	1.23−13	8.76−14	5.62−14	4.04−14	2.91−14	2.55−14	3.28−14	2.85−14	1.36−14	6.25−15	2.46−15	7.07−16
R	3	+1	3.81−14	2.70−14	1.72−14	1.22−14	8.62−15	7.53−15	1.17−14	1.16−14	5.85−15	2.68−15	1.01−15	2.76−16
R	4	+1	3.94−13	2.73−13	1.64−13	1.07−13	6.70−14	3.36−14	2.23−14	1.49−14	6.38−15	2.78−15	1.03−15	2.69−16
R	5	+1	9.82−14	6.78−14	4.02−14	2.59−14	1.57−14	1.42−14	2.67−14	2.68−14	1.30−14	5.79−15	2.05−15	5.21−16
R	6	+1	3.44−14	2.46−14	1.59−14	1.15−14	8.29−15	8.14−15	1.55−14	1.67−14	8.69−15	4.00−15	1.48−15	3.99−16
R	7	+1	1.18−14	8.40−15	5.37−15	3.81−15	2.68−15	2.61−15	5.19−15	5.66−15	2.95−15	1.35−15	4.95−16	1.31−16
R	8	+1	1.35−13	9.41−14	5.67−14	3.73−14	2.33−14	1.44−14	1.87−14	1.85−14	9.26−15	4.15−15	1.48−15	3.78−16
R	9	+1	1.31−13	8.69−14	4.66−14	2.68−14	1.41−14	1.38−14	3.81−14	4.45−14	2.35−14	1.06−14	3.75−15	9.48−16
R	10	+1	4.33−14	2.87−14	1.54−14	8.83−15	4.65−15	5.71−15	1.79−14	2.15−14	1.15−14	5.19−15	1.84−15	4.64−16
R	11	+1	3.78−14	2.62−14	1.55−14	9.99−15	6.06−15	4.91−15	1.04−14	1.15−14	6.03−15	2.71−15	9.61−16	2.44−16
R	12	+1	1.47−14	1.05−14	6.84−15	4.93−15	3.53−15	4.33−15	1.11−14	1.31−14	7.07−15	3.25−15	1.18−15	3.07−16
R	13	+1	5.30−15	3.76−15	2.39−15	1.69−15	1.18−15	1.58−15	4.47−15	5.37−15	2.89−15	1.33−15	4.79−16	1.24−16
R	14	+1	6.18−14	4.30−14	2.60−14	1.70−14	1.06−14	7.36−15	1.31−14	1.45−14	7.61−15	3.46−15	1.23−15	3.13−16
R	15	+1	8.21−14	5.44−14	2.92−14	1.67−14	8.80−15	1.02−14	3.31−14	4.10−14	2.22−14	1.02−14	3.59−15	9.09−16
R	16	+1	5.52−14	3.44−14	1.63−14	8.31−15	3.86−15	5.62−15	2.07−14	2.60−14	1.41−14	6.46−15	2.28−15	5.78−16
R	17	+1	1.84−14	1.14−14	5.43−15	2.77−15	1.28−15	2.06−15	7.76−15	9.75−15	5.32−15	2.43−15	8.58−16	2.17−16
R	18	+1	2.71−14	1.79−14	9.61−15	5.51−15	2.90−15	4.46−15	1.62−14	2.02−14	1.10−14	5.02−15	1.77−15	4.49−16
R	19	+1	1.83−14	1.26−14	7.45−15	4.77−15	2.87−15	3.32−15	9.88−15	1.20−14	6.50−15	2.96−15	1.05−15	2.65−16
	−1													
	−1	−1												

Table 3
First stage collisional datafile for Li^{2+}. See page 821 for Explanation of Tables

Li+	2		3		3 987661.0(1S)								
	1	$n=1$			(2)0(0.5)		0.0	{1}1.000					
	2	$n=2$			(2)0(3.5)		740749.7	{1}1.000					
	3	$n=3$			(2)0(8.5)		877927.0	{1}1.000					
	4	$n=4$			(2)0(15.5)		925936.8	{1}1.000					
	5	$n=5$			(2)0(24.5)		948157.9	{1}1.000					
	−1												
	3.00		3	1.80+04	4.50+04	9.00+04	1.80+05	4.50+05	9.00+05	1.80+06	4.50+06	9.00+06	1.80+07
	2	1	3.81+10	2.86−01	2.95−01	3.07−01	3.23−01	3.67−01	4.37−01	5.44−01	7.50−01	9.79−01	1.25+00
	3	1	4.50+09	8.30−02	8.34−02	8.14−02	8.08−02	8.51−02	9.43−02	1.10−01	1.41−01	1.76−01	2.20−01
	4	1	1.04+09	3.56−02	3.44−02	3.35−02	3.31−02	3.41−02	3.68−02	4.18−02	5.23−02	6.44−02	7.92−02
	5	1	3.35+08	2.07−02	2.06−02	1.95−02	1.85−02	1.80−02	1.87−02	2.07−02	2.53−02	3.09−02	3.78−02
	3	2	3.57+09	1.28+01	1.36+01	1.43+01	1.61+01	2.12+01	2.75+01	3.54+01	4.75+01	5.77+01	6.83+01
	4	2	6.82+08	4.14+00	3.97+00	3.87+00	4.00+00	4.65+00	5.55+00	6.68+00	8.38+00	9.79+00	1.12+01
	5	2	2.05+08	2.11+00	2.04+00	1.92+00	1.85+00	1.96+00	2.21+00	2.56+00	3.11+00	3.57+00	4.06+00
	4	3	7.29+08	1.11+02	1.18+02	1.34+02	1.67+02	2.41+02	3.18+02	4.03+02	5.22+02	6.15+02	7.09+02
	5	3	1.78+08	3.93+01	4.04+01	4.11+01	4.39+01	5.20+01	6.10+01	7.14+01	8.59+01	9.71+01	1.08+02
	5	4	2.19+08	6.31+02	7.43+02	8.98+02	1.14+03	1.58+03	1.98+03	2.41+03	3.00+03	3.45+03	3.91+03
R	1	+1		1.10−12	6.84−13	4.75−13	3.24−13	1.86−13	1.16−13	6.84−14	3.04−14	1.52−14	7.09−15
R	2	+1		5.84−13	3.51−13	2.31−13	1.45−13	7.22−14	3.95−14	2.02−14	7.63−15	3.44−15	1.48−15
R	3	+1		3.85−13	2.20−13	1.37−13	8.02−14	3.59−14	1.82−14	8.70−15	3.06−15	1.32−15	5.48−16
R	4	+1		2.77−13	1.50−13	8.89−14	4.93−14	2.06−14	9.94−15	4.57−15	1.54−15	6.49−16	2.65−16
R	5	+1		2.10−13	1.09−13	6.16−14	3.27−14	1.30−14	6.06−15	2.72−15	8.89−16	3.69−16	1.49−16
S	1	+1		9.01−11	2.50−10	3.84−10	5.40−10	7.95−10	1.01−09	1.20−09	1.34−09	1.33−09	1.23−09
S	2	+1		4.00−09	6.26−09	7.93−09	9.46−09	1.08−08	1.10−08	1.04−08	8.83−09	7.38−09	5.95−09
S	3	+1		2.48−08	3.34−08	3.78−08	3.95−08	3.71−08	3.27−08	2.74−08	2.04−08	1.58−08	1.21−08
S	4	+1		7.77−08	9.10−08	9.15−08	8.45−08	6.82−08	5.44−08	4.20−08	2.89−08	2.15−08	1.59−08

Table 4
Effective recombination data for all ion stages of Li. See page 821 for Explanation of Tables

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
8.00000	8.69897	9.00000	9.69897	10.00000	10.69897	11.00000	11.69897
12.00000	12.69897	13.00000	13.69897	14.00000	14.69897	15.00000	15.69897
−0.69877	−0.52268	−0.30083	−0.15470	0.00020	0.47732	0.69917	0.84530
1.00020	1.30123	1.47732	1.60226	1.69917	1.77835	1.84530	1.95444
2.00020	2.47732	2.69917	2.84530	3.00020	3.47732	3.69917	3.84530
4.00020							
--------------------------------/		IPRT = 1	/ IGRD = 1	/----------------/	Z1 = 1	/ DATE = 11/11/02	
−12.02214	−11.97143	−11.94413	−11.85814	−11.81144	−11.67426	−11.60278	−11.39276
−11.28279	−10.97710	−10.81355	−10.31011	−10.04681	−9.38496	−9.08766	−8.38869
−12.18686	−12.15291	−12.13387	−12.07668	−12.04419	−11.94625	−11.89493	−11.74443
−11.66569	−11.43932	−11.31055	−10.88485	−10.64975	−10.03079	−9.74146	−9.04249
−12.38609	−12.36527	−12.35378	−12.31763	−12.29758	−12.23869	−12.20649	−12.11160
−12.06129	−11.90699	−11.81074	−11.47862	−11.29127	−10.77956	−10.51158	−9.81261
−12.51273	−12.49878	−12.49084	−12.46509	−12.45108	−12.40908	−12.38621	−12.31798
−12.28119	−12.16501	−12.08998	−11.83090	−11.68540	−11.26908	−11.02043	−10.32146
−12.64604	−12.63688	−12.63152	−12.61519	−12.60543	−12.57651	−12.56100	−12.51606
−12.49064	−12.40711	−12.35193	−12.16967	−12.06882	−11.75070	−11.52136	−10.82239
−13.05131	−13.05200	−13.05152	−13.04683	−13.04487	−13.04150	−13.03992	−13.03205
−13.02925	−13.01681	−13.01161	−13.02514	−13.02873	−12.91614	−12.72649	−12.02752
−13.25009	−13.25008	−13.25003	−13.24974	−13.24995	−13.25049	−13.25077	−13.25298
−13.25416	−13.26155	−13.27207	−13.34263	−13.37029	−13.30591	−13.12986	−12.43089
−13.36851	−13.36887	−13.36957	−13.37045	−13.37120	−13.37368	−13.37535	−13.38159
−13.38599	−13.40562	−13.42579	−13.52335	−13.55977	−13.52849	−13.36676	−12.66779
−13.41704	−13.41785	−13.41882	−13.42032	−13.42099	−13.42495	−13.42729	−13.43556
−13.44182	−13.47066	−13.49790	−13.61106	−13.65110	−13.67195	−13.53887	−12.83990
−13.27163	−13.27461	−13.27562	−13.27862	−13.27974	−13.28256	−13.28447	−13.29048
−13.29497	−13.32073	−13.34513	−13.44315	−13.47611	−13.57384	−13.49024	−12.79127
−13.20697	−13.21134	−13.21262	−13.21586	−13.21710	−13.21919	−13.22053	−13.22594
−13.22971	−13.25323	−13.27583	−13.37423	−13.40823	−13.51859	−13.44490	−12.74593
−13.20224	−13.20706	−13.20849	−13.21165	−13.21287	−13.21506	−13.21634	−13.22046
−13.22395	−13.24548	−13.26752	−13.36808	−13.40404	−13.52238	−13.45137	−12.75240
−13.22391	−13.22873	−13.23034	−13.23335	−13.23438	−13.23697	−13.23831	−13.24168
−13.24515	−13.26622	−13.28821	−13.38914	−13.42627	−13.54895	−13.47934	−12.78037
−13.25991	−13.26452	−13.26630	−13.26948	−13.27033	−13.27304	−13.27442	−13.27760
−13.28103	−13.30206	−13.32385	−13.42442	−13.46215	−13.58724	−13.51862	−12.81965
−13.30479	−13.30915	−13.31106	−13.31482	−13.31560	−13.31798	−13.31933	−13.32267
−13.32590	−13.34652	−13.36774	−13.46813	−13.50623	−13.63305	−13.56507	−12.86610
−13.40930	−13.41405	−13.41586	−13.42025	−13.42140	−13.42333	−13.42471	−13.42836
−13.43139	−13.45033	−13.47065	−13.57063	−13.60921	−13.73810	−13.67100	−12.97203
−13.46491	−13.47034	−13.47199	−13.47615	−13.47769	−13.47976	−13.48120	−13.48486
−13.48798	−13.50594	−13.52618	−13.62572	−13.66449	−13.79392	−13.72721	−13.02824
−14.19826	−14.20624	−14.20937	−14.21573	−14.21789	−14.22206	−14.22367	−14.22759
−14.23070	−14.24726	−14.26384	−14.35486	−14.39542	−14.53401	−14.46860	−13.76963
−14.53104	−14.53901	−14.54215	−14.54850	−14.55067	−14.55483	−14.55644	−14.56036
−14.56348	−14.58003	−14.59662	−14.68763	−14.72820	−14.86679	−14.80137	−14.10240
−14.75023	−14.75820	−14.76134	−14.76769	−14.76986	−14.77403	−14.77563	−14.77956
−14.78267	−14.79922	−14.81581	−14.90682	−14.94739	−15.08598	−15.02057	−14.32160
−14.98258	−14.99056	−14.99369	−15.00004	−15.00221	−15.00638	−15.00799	−15.01191
−15.01502	−15.03158	−15.04816	−15.13917	−15.17974	−15.31833	−15.25292	−14.55395
−15.69826	−15.70624	−15.70937	−15.71573	−15.71789	−15.72206	−15.72367	−15.72759
−15.73070	−15.74726	−15.76384	−15.85486	−15.89542	−16.03401	−15.96860	−15.26963
−16.03104	−16.03901	−16.04215	−16.04850	−16.05067	−16.05483	−16.05644	−16.06036
−16.06348	−16.08003	−16.09662	−16.18763	−16.22820	−16.36679	−16.30137	−15.60240
−16.25023	−16.25820	−16.26134	−16.26769	−16.26986	−16.27403	−16.27563	−16.27956
−16.28267	−16.29922	−16.31581	−16.40682	−16.44739	−16.58598	−16.52057	−15.82160
−16.48258	−16.49056	−16.49369	−16.50004	−16.50221	−16.50638	−16.50799	−16.51191
−16.51502	−16.53158	−16.54816	−16.63917	−16.67974	−16.81833	−16.75292	−16.05395
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−11.95636	−11.95611	−11.95563	−11.95509	−11.95408	−11.94886	−11.94774	−11.94187
−11.93778	−11.92727	−11.91858	−11.88554	−11.85453	−11.64819	−11.42247	−10.72350
−11.61373	−11.61374	−11.61383	−11.61415	−11.61414	−11.61276	−11.61298	−11.61018

Table 4 (*continued*)

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
−11.61004	−11.60997	−11.61035	−11.61501	−11.61345	−11.62440	−11.50412	−10.80515
−11.08972	−11.08974	−11.08971	−11.08966	−11.08966	−11.08947	−11.08968	−11.09223
−11.09197	−11.09859	−11.10661	−11.16330	−11.19679	−11.35673	−11.29601	−10.59704
−10.91134	−10.91134	−10.91135	−10.91133	−10.91136	−10.91121	−10.91144	−10.91515
−10.91655	−10.92956	−10.94552	−11.04956	−11.11490	−11.35344	−11.31034	−10.61137
−10.83823	−10.83824	−10.83823	−10.83827	−10.83823	−10.83791	−10.83786	−10.84046
−10.84525	−10.86849	−10.89518	−11.05592	−11.15605	−11.46346	−11.43291	−10.73394
−11.05203	−11.05201	−11.05203	−11.05170	−11.05203	−11.05576	−11.05567	−11.06288
−11.07245	−11.13670	−11.20401	−11.52487	−11.69164	−12.04217	−12.00898	−11.31001
−11.28177	−11.28176	−11.28177	−11.28173	−11.28177	−11.28281	−11.28408	−11.29418
−11.30593	−11.38538	−11.46736	−11.82787	−11.99683	−12.31580	−12.27357	−11.57460
−11.45331	−11.45330	−11.45331	−11.45318	−11.45331	−11.45571	−11.45714	−11.46910
−11.48341	−11.57728	−11.67077	−12.04899	−12.20960	−12.49616	−12.44818	−11.74921
−11.64801	−11.64802	−11.64801	−11.64805	−11.64801	−11.65037	−11.65340	−11.66695
−11.68440	−11.79189	−11.89667	−12.28280	−12.43088	−12.68132	−12.62821	−11.92924
−12.04590	−12.04587	−12.04590	−12.04542	−12.04579	−12.04970	−12.04971	−12.06591
−12.08328	−12.19248	−12.29403	−12.65261	−12.77622	−12.98572	−12.92636	−12.22739
−12.28615	−12.28616	−12.28615	−12.28636	−12.28665	−12.28794	−12.29015	−12.30440
−12.32050	−12.42096	−12.51550	−12.84860	−12.96125	−13.15391	−13.09364	−12.39467
−12.45720	−12.45723	−12.45720	−12.45778	−12.45860	−12.45879	−12.46025	−12.47306
−12.48660	−12.57659	−12.66208	−12.97489	−13.08585	−13.27499	−13.21375	−12.51478
−12.59151	−12.59152	−12.59151	−12.59187	−12.59236	−12.59246	−12.59377	−12.60654
−12.61905	−12.70194	−12.78270	−13.08454	−13.19149	−13.37683	−13.31486	−12.61589
−12.70232	−12.70233	−12.70232	−12.70236	−12.70234	−12.70282	−12.70452	−12.71702
−12.72962	−12.80843	−12.88639	−13.18113	−13.28381	−13.46538	−13.40301	−12.70404
−12.79649	−12.79650	−12.79649	−12.79640	−12.79625	−12.79724	−12.79934	−12.81053
−12.82360	−12.90024	−12.97518	−13.26291	−13.36333	−13.54272	−13.48024	−12.78127
−12.95146	−12.95146	−12.95146	−12.95163	−12.95156	−12.95294	−12.95513	−12.96421
−12.97752	−13.05108	−13.12125	−13.39674	−13.49556	−13.67380	−13.61168	−12.91271
−13.01717	−13.01715	−13.01717	−13.01761	−13.01754	−13.01869	−13.02058	−13.02955
−13.04242	−13.11426	−13.18304	−13.45389	−13.55231	−13.73078	−13.66897	−12.97000
−13.71678	−13.71678	−13.71678	−13.71681	−13.71678	−13.71734	−13.71859	−13.72622
−13.73526	−13.79051	−13.84657	−14.08496	−14.18054	−14.36564	−14.30390	−13.60493
−14.04955	−14.04955	−14.04955	−14.04958	−14.04955	−14.05012	−14.05137	−14.05899
−14.06804	−14.12328	−14.17934	−14.41774	−14.51331	−14.69842	−14.63667	−13.93770
−14.26874	−14.26875	−14.26874	−14.26877	−14.26874	−14.26931	−14.27056	−14.27818
−14.28723	−14.34247	−14.39854	−14.63693	−14.73250	−14.91761	−14.85586	−14.15689
−14.50110	−14.50110	−14.50110	−14.50113	−14.50110	−14.50166	−14.50291	−14.51053
−14.51958	−14.57482	−14.63089	−14.86928	−14.96485	−15.14996	−15.08822	−14.38925
−15.21678	−15.21678	−15.21678	−15.21681	−15.21678	−15.21734	−15.21859	−15.22622
−15.23526	−15.29051	−15.34657	−15.58496	−15.68054	−15.86564	−15.80390	−15.10493
−15.54955	−15.54955	−15.54955	−15.54958	−15.54955	−15.55012	−15.55137	−15.55899
−15.56804	−15.62328	−15.67934	−15.91774	−16.01331	−16.19842	−16.13667	−15.43770
−15.76874	−15.76875	−15.76874	−15.76877	−15.76874	−15.76931	−15.77056	−15.77818
−15.78723	−15.84247	−15.89854	−16.13693	−16.23250	−16.41761	−16.35586	−15.65689
−16.00110	−16.00110	−16.00110	−16.00113	−16.00110	−16.00166	−16.00291	−16.01053
−16.01958	−16.07482	−16.13089	−16.36928	−16.46485	−16.64996	−16.58822	−15.88925
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−11.80767	−11.76485	−11.72431	−11.63756	−11.58006	−11.43977	−11.35400	−11.12189
−10.98934	−10.60654	−10.41128	−9.85248	−9.55716	−8.76240	−8.41834	−7.72991
−11.90047	−11.86747	−11.83741	−11.76681	−11.72261	−11.60953	−11.54134	−11.35340
−11.24565	−10.93415	−10.77277	−10.30391	−10.05214	−9.35460	−9.02464	−8.39355
−12.01959	−11.99631	−11.97999	−11.93059	−11.90195	−11.82202	−11.77648	−11.64442
−11.56870	−11.34651	−11.22786	−10.87153	−10.67635	−10.11788	−9.84668	−9.22254
−12.10238	−12.08516	−12.07499	−12.04094	−12.02143	−11.96168	−11.92965	−11.83370
−11.77658	−11.61068	−11.51920	−11.23741	−11.07712	−10.60399	−10.36444	−9.75801
−12.21080	−12.19874	−12.19171	−12.16803	−12.15381	−12.11203	−12.08931	−12.01816
−11.97725	−11.85290	−11.78452	−11.56286	−11.43307	−11.03848	−10.82770	−10.26183
−12.53420	−12.53130	−12.52906	−12.52096	−12.51556	−12.50233	−12.49409	−12.46846
−12.45353	−12.40455	−12.37326	−12.26022	−12.18718	−11.96919	−11.86489	−11.59453
−12.68732	−12.68435	−12.68302	−12.67960	−12.67699	−12.66806	−12.66451	−12.64939
−12.64013	−12.60866	−12.58969	−12.51816	−12.47140	−12.33025	−12.26125	−12.08172

(*continued on next page*)

Table 4 (*continued*)

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
−12.78473	−12.78162	−12.78193	−12.77867	−12.77732	−12.77047	−12.76773	−12.75691
−12.74995	−12.72942	−12.71676	−12.66486	−12.63156	−12.52855	−12.47649	−12.34072
−12.86170	−12.86149	−12.86330	−12.86251	−12.86020	−12.85888	−12.85852	−12.85278
−12.84853	−12.83717	−12.82761	−12.79867	−12.77701	−12.70570	−12.66913	−12.57058
−12.59706	−12.61841	−12.62850	−12.65654	−12.67149	−12.70857	−12.72395	−12.76523
−12.78325	−12.82566	−12.84465	−12.88170	−12.89303	−12.90028	−12.89618	−12.87411
−12.30880	−12.33754	−12.35049	−12.38888	−12.40894	−12.46366	−12.48804	−12.55117
−12.58141	−12.65642	−12.69119	−12.77804	−12.81303	−12.87242	−12.89248	−12.92953
−12.18749	−12.21754	−12.23082	−12.27100	−12.29279	−12.35079	−12.37787	−12.44638
−12.48016	−12.56682	−12.60695	−12.71118	−12.75545	−12.83977	−12.87286	−12.94182
−12.14387	−12.17446	−12.18820	−12.22906	−12.25157	−12.31155	−12.33987	−12.41170
−12.44699	−12.53858	−12.58139	−12.69466	−12.74245	−12.83992	−12.87733	−12.96302
−12.13542	−12.16673	−12.18086	−12.22213	−12.24487	−12.30613	−12.33476	−12.40877
−12.44514	−12.53912	−12.58452	−12.70275	−12.75355	−12.85764	−12.89894	−12.99392
−12.14428	−12.17624	−12.19059	−12.23197	−12.25474	−12.31678	−12.34557	−12.42068
−12.45782	−12.55343	−12.60060	−12.72184	−12.77510	−12.88328	−12.92757	−13.02835
−12.18472	−12.21718	−12.23153	−12.27253	−12.29513	−12.35765	−12.38726	−12.46254
−12.50029	−12.59862	−12.64638	−12.77111	−12.82684	−12.94138	−12.98760	−13.09572
−12.20986	−12.24226	−12.25662	−12.29739	−12.31984	−12.38226	−12.41218	−12.48746
−12.52522	−12.62450	−12.67211	−12.79771	−12.85405	−12.97088	−13.01735	−13.12791
−12.65559	−12.68712	−12.70033	−12.73856	−12.75916	−12.81950	−12.84964	−12.92375
−12.95901	−13.05666	−13.10293	−13.22616	−13.28470	−13.40895	−13.45767	−13.57465
−12.93504	−12.96491	−12.97957	−13.01683	−13.03713	−13.09586	−13.12497	−13.19868
−13.23481	−13.33114	−13.37776	−13.50146	−13.55998	−13.68790	−13.73571	−13.85262
−13.13426	−13.16194	−13.17691	−13.21288	−13.23301	−13.29107	−13.32049	−13.39319
−13.42924	−13.52609	−13.57298	−13.69656	−13.75705	−13.88556	−13.93525	−14.04733
−13.34524	−13.37419	−13.38881	−13.42491	−13.44343	−13.50064	−13.53010	−13.60222
−13.63857	−13.73266	−13.77909	−13.90328	−13.96153	−14.09336	−14.14219	−14.25168
−14.06065	−14.08963	−14.10425	−14.14036	−14.15886	−14.21605	−14.24551	−14.31762
−14.35398	−14.44802	−14.49444	−14.61865	−14.67685	−14.80873	−14.85754	−14.96701
−14.39342	−14.42241	−14.43703	−14.47313	−14.49163	−14.54883	−14.57829	−14.65039
−14.68676	−14.78080	−14.82721	−14.95142	−15.00963	−15.14151	−15.19031	−15.29979
−14.61262	−14.64160	−14.65622	−14.69232	−14.71082	−14.76802	−14.79748	−14.86958
−14.90595	−14.99999	−15.04641	−15.17061	−15.22882	−15.36070	−15.40950	−15.51898
−14.84497	−14.87395	−14.88857	−14.92467	−14.94317	−15.00037	−15.02983	−15.10194
−15.13830	−15.23234	−15.27876	−15.40297	−15.46117	−15.59305	−15.64186	−15.75133
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−11.34139	−11.29784	−11.26890	−11.17938	−11.12925	−10.98314	−10.90586	−10.66360
−10.53068	−10.13895	−9.93880	−9.38730	−9.11573	−8.43037	−8.11628	−7.33632
−11.48889	−11.45274	−11.43165	−11.35155	−11.30976	−11.18558	−11.11955	−10.91359
−10.79882	−10.51441	−10.34791	−9.88821	−9.66017	−9.07413	−8.79538	−8.08013
−11.67666	−11.65395	−11.63880	−11.58580	−11.55796	−11.47407	−11.42849	−11.28662
−11.20756	−10.98162	−10.86002	−10.51797	−10.34504	−9.88457	−9.65305	−9.01265
−11.80146	−11.78226	−11.77242	−11.73431	−11.71383	−11.65379	−11.62039	−11.51492
−11.45624	−11.28298	−11.18988	−10.92234	−10.78391	−10.40536	−10.20243	−9.61415
−11.92964	−11.91365	−11.90753	−11.88147	−11.86755	−11.82450	−11.80029	−11.72465
−11.68263	−11.55553	−11.48577	−11.28215	−11.17461	−10.86755	−10.69355	−10.16765
−12.30961	−12.30626	−12.30411	−12.29628	−12.29220	−12.27924	−12.27163	−12.24617
−12.23174	−12.18279	−12.15280	−12.05838	−12.01123	−11.89887	−11.83662	−11.62460
−12.49289	−12.49082	−12.49006	−12.48585	−12.48334	−12.47671	−12.47181	−12.45894
−12.45037	−12.42351	−12.40650	−12.35931	−12.33961	−12.29910	−12.27229	−12.16077
−12.61114	−12.61089	−12.60978	−12.60731	−12.60643	−12.60154	−12.59866	−12.59123
−12.58667	−12.56830	−12.55872	−12.53605	−12.52994	−12.52208	−12.51435	−12.45141
−12.72034	−12.71989	−12.71828	−12.71755	−12.71739	−12.71675	−12.71651	−12.71274
−12.71112	−12.70359	−12.70161	−12.69998	−12.70545	−12.72920	−12.73653	−12.71341
−12.53299	−12.53989	−12.54421	−12.55827	−12.56615	−12.58910	−12.60043	−12.63589
−12.65424	−12.70513	−12.73268	−12.82004	−12.86594	−12.97456	−13.01768	−13.07532
−12.26262	−12.27215	−12.27772	−12.29636	−12.30752	−12.33986	−12.35693	−12.40974
−12.43795	−12.51934	−12.56580	−12.70792	−12.78334	−12.96064	−13.03048	−13.14748
−12.14578	−12.15618	−12.16176	−12.18117	−12.19259	−12.22705	−12.24531	−12.30114
−12.33162	−12.42134	−12.47265	−12.63645	−12.72407	−12.93676	−13.02301	−13.17536
−12.10535	−12.11585	−12.12132	−12.14097	−12.15279	−12.18822	−12.20691	−12.26429
−12.29592	−12.39008	−12.44307	−12.61549	−12.70905	−12.94205	−13.03592	−13.20736

Table 4 (*continued*)

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
−12.09974	−12.11039	−12.11590	−12.13577	−12.14781	−12.18328	−12.20224	−12.26063
−12.29315	−12.38953	−12.44374	−12.62028	−12.71767	−12.96120	−13.06074	−13.24409
−12.11096	−12.12163	−12.12720	−12.14724	−12.15935	−12.19467	−12.21380	−12.27269
−12.30580	−12.40330	−12.45840	−12.63726	−12.73701	−12.98696	−13.09083	−13.28234
−12.15450	−12.16470	−12.17026	−12.19031	−12.20236	−12.23781	−12.25704	−12.31586
−12.34929	−12.44765	−12.50342	−12.68455	−12.78599	−13.04555	−13.15451	−13.35661
−12.18063	−12.19064	−12.19618	−12.21611	−12.22809	−12.26359	−12.28276	−12.34151
−12.37488	−12.47321	−12.52903	−12.71048	−12.81227	−13.07532	−13.18596	−13.39189
−12.63432	−12.64479	−12.64966	−12.66671	−12.67649	−12.71040	−12.72950	−12.78463
−12.81526	−12.90827	−12.96043	−13.13150	−13.23098	−13.50694	−13.62976	−13.86772
−12.92242	−12.92926	−12.93659	−12.95028	−12.96263	−12.99450	−13.01259	−13.06695
−13.09727	−13.18948	−13.24050	−13.40608	−13.50427	−13.78059	−13.90471	−14.15042
−13.12313	−13.13229	−13.13679	−13.15332	−13.16301	−13.19570	−13.21329	−13.26641
−13.29639	−13.38792	−13.43940	−13.60176	−13.69848	−13.97390	−14.09975	−14.34945
−13.34074	−13.34959	−13.35426	−13.36973	−13.37900	−13.41033	−13.42752	−13.48074
−13.51040	−13.59909	−13.64887	−13.80889	−13.90362	−14.17513	−14.30074	−14.55589
−14.05626	−14.06509	−14.06978	−14.08521	−14.09450	−14.12580	−14.14298	−14.19621
−14.22587	−14.31451	−14.36426	−14.52427	−14.61897	−14.89042	−15.01601	−15.27124
−14.38903	−14.39786	−14.40255	−14.41798	−14.42727	−14.45857	−14.47576	−14.52898
−14.55864	−14.64729	−14.69704	−14.85704	−14.95174	−15.22319	−15.34879	−15.60401
−14.60822	−14.61705	−14.62175	−14.63717	−14.64646	−14.67776	−14.69495	−14.74818
−14.77783	−14.86648	−14.91623	−15.07623	−15.17093	−15.44238	−15.56798	−15.82320
−14.84058	−14.84941	−14.85410	−14.86953	−14.87881	−14.91012	−14.92730	−14.98053
−15.01019	−15.09883	−15.14858	−15.30858	−15.40329	−15.67474	−15.80033	−16.05555
--------------------------------/		IPRT = 1	/ IGRD = 1	/-----------------/	Z1 = 3	/ DATE = 11/11/02	
−10.75418	−10.71315	−10.69192	−10.64042	−10.60638	−10.49137	−10.42178	−10.22237
−10.11974	−9.80860	−9.63684	−9.13260	−8.87156	−8.15247	−7.80211	−6.94326
−10.88280	−10.84792	−10.82942	−10.78267	−10.75319	−10.65380	−10.59530	−10.42489
−10.33598	−10.06697	−9.91746	−9.47993	−9.25269	−8.62498	−8.31574	−7.53806
−11.04472	−11.01756	−11.00252	−10.96206	−10.93839	−10.85877	−10.81415	−10.67990
−10.60833	−10.39254	−10.27110	−9.91759	−9.73300	−9.22009	−8.96253	−8.28723
−11.15039	−11.12793	−11.11556	−11.08175	−11.06247	−10.99666	−10.96022	−10.84686
−10.78715	−10.60744	−10.50479	−10.20666	−10.05053	−9.61061	−9.38612	−8.77902
−11.26194	−11.24475	−11.23534	−11.20901	−11.19396	−11.14319	−11.11392	−11.02500
−10.97794	−10.83423	−10.75252	−10.51314	−10.38675	−10.02544	−9.83643	−9.30093
−11.60438	−11.59862	−11.59535	−11.58791	−11.58297	−11.56407	−11.55349	−11.52303
−11.50556	−11.45088	−11.41970	−11.32408	−11.27234	−11.11537	−11.02422	−10.72602
−11.76335	−11.76032	−11.75863	−11.75217	−11.74911	−11.73904	−11.73333	−11.71441
−11.70355	−11.67072	−11.65110	−11.59345	−11.56149	−11.45980	−11.40038	−11.20462
−11.86764	−11.86695	−11.86586	−11.86047	−11.85837	−11.85052	−11.84637	−11.83329
−11.82595	−11.80187	−11.78816	−11.74643	−11.72337	−11.65131	−11.60729	−11.46373
−11.98017	−11.97919	−11.97837	−11.97578	−11.97457	−11.96937	−11.96636	−11.95752
−11.95282	−11.93509	−11.92465	−11.89780	−11.88166	−11.82878	−11.79910	−11.69870
−12.20599	−12.20579	−12.20548	−12.20423	−12.20340	−12.20141	−12.20029	−12.19576
−12.19332	−12.18632	−12.18210	−12.16809	−12.16011	−12.13593	−12.12150	−12.07359
−12.34297	−12.34238	−12.34195	−12.34189	−12.34126	−12.34006	−12.33962	−12.33675
−12.33520	−12.33092	−12.32810	−12.31974	−12.31484	−12.29921	−12.29040	−12.26147
−12.44284	−12.44227	−12.44186	−12.44158	−12.44110	−12.44044	−12.44012	−12.43855
−12.43752	−12.43445	−12.43241	−12.42608	−12.42305	−12.41254	−12.40636	−12.38630
−12.52168	−12.52193	−12.52195	−12.52044	−12.51990	−12.52005	−12.51948	−12.51850
−12.51790	−12.51553	−12.51398	−12.50887	−12.50707	−12.49984	−12.49486	−12.47997
−12.58746	−12.58792	−12.58808	−12.58665	−12.58623	−12.58668	−12.58586	−12.58470
−12.58458	−12.58237	−12.58133	−12.57778	−12.57635	−12.57083	−12.56687	−12.55550
−12.64402	−12.64421	−12.64428	−12.64376	−12.64357	−12.64391	−12.64301	−12.64148
−12.64175	−12.63959	−12.63896	−12.63689	−12.63552	−12.63074	−12.62776	−12.61900
−12.73746	−12.73735	−12.73731	−12.73760	−12.73762	−12.73771	−12.73717	−12.73606
−12.73638	−12.73523	−12.73467	−12.73341	−12.73287	−12.72880	−12.72720	−12.72206
−12.77727	−12.77719	−12.77716	−12.77737	−12.77740	−12.77743	−12.77715	−12.77657
−12.77672	−12.77625	−12.77548	−12.77391	−12.77393	−12.77025	−12.76908	−12.76526
−13.22497	−13.22497	−13.22498	−13.22496	−13.22497	−13.22493	−13.22511	−13.22531
−13.22558	−13.22578	−13.22579	−13.22691	−13.22714	−13.22720	−13.22791	−13.22920
−13.45297	−13.45297	−13.45297	−13.45297	−13.45297	−13.45297	−13.45295	−13.45295
−13.45291	−13.45410	−13.45449	−13.45419	−13.45463	−13.45643	−13.45732	−13.45885

(*continued on next page*)

Table 4 (*continued*)

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
−13.61038	−13.61038	−13.61038	−13.61038	−13.61038	−13.61040	−13.61039	−13.61043
−13.61034	−13.61075	−13.61073	−13.61213	−13.61252	−13.61403	−13.61529	−13.61761
−13.78404	−13.78403	−13.78403	−13.78404	−13.78400	−13.78394	−13.78395	−13.78394
−13.78395	−13.78372	−13.78359	−13.78395	−13.78517	−13.78681	−13.78825	−13.79000
−14.37464	−14.37464	−14.37464	−14.37464	−14.37464	−14.37463	−14.37465	−14.37457
−14.37488	−14.37533	−14.37550	−14.37660	−14.37696	−14.37844	−14.37963	−14.38240
−14.70742	−14.70741	−14.70741	−14.70741	−14.70741	−14.70741	−14.70743	−14.70735
−14.70765	−14.70810	−14.70827	−14.70937	−14.70973	−14.71122	−14.71240	−14.71518
−14.92661	−14.92660	−14.92660	−14.92660	−14.92660	−14.92660	−14.92662	−14.92654
−14.92684	−14.92730	−14.92746	−14.92857	−14.92893	−14.93041	−14.93159	−14.93437
−15.15896	−15.15895	−15.15896	−15.15896	−15.15896	−15.15895	−15.15897	−15.15889
−15.15919	−15.15965	−15.15982	−15.16092	−15.16128	−15.16276	−15.16395	−15.16672

Table 5
Effective ionization data for all ion stages of Li. See page 821 for Explanation of Tables

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
8.00000	8.69897	9.00000	9.69897	10.00000	10.69897	11.00000	11.69897
12.00000	12.69897	13.00000	13.69897	14.00000	14.69897	15.00000	15.69897
−0.69877	−0.52268	−0.30083	−0.15470	0.00020	0.47732	0.69917	0.84530
1.00020	1.30123	1.47732	1.60226	1.69917	1.77835	1.84530	1.95444
2.00020	2.47732	2.69917	2.84530	3.00020	3.47732	3.69917	3.84530
4.00020							
--------------------------------/		IPRT = 1	/ IGRD = 1	/----------------/	Z1 = 1	/ DATE = 11/11/02	
−16.93722	−16.72271	−16.63079	−16.41016	−16.31072	−16.06127	−15.94488	−15.65438
−15.52762	−15.28691	−15.22451	−15.14332	−15.10910	−15.00506	−14.96643	−14.87866
−13.99166	−13.79366	−13.70826	−13.50558	−13.41466	−13.19115	−13.08877	−12.84132
−12.73789	−12.55652	−12.50624	−12.36061	−12.24862	−11.95506	−11.86584	−11.66801
−11.48081	−11.34983	−11.28779	−11.13155	−11.05892	−10.87795	−10.79323	−10.59179
−10.51186	−10.36466	−10.29775	−9.98771	−9.78006	−9.38523	−9.29245	−9.09349
−10.25901	−10.18090	−10.14127	−10.03242	−9.97863	−9.83751	−9.76917	−9.60268
−9.53525	−9.39219	−9.30718	−8.92829	−8.71041	−8.34860	−8.27228	−8.11108
−9.26906	−9.22535	−9.20159	−9.13310	−9.09780	−8.99784	−8.94715	−8.81859
−8.76294	−8.62362	−8.52588	−8.12082	−7.91743	−7.61361	−7.55487	−7.43241
−7.66492	−7.65057	−7.64329	−7.61784	−7.60315	−7.56140	−7.53796	−7.47095
−7.43587	−7.30289	−7.19184	−6.83127	−6.69811	−6.54335	−6.51898	−6.46966
−7.37261	−7.36042	−7.35352	−7.33317	−7.32129	−7.28432	−7.26324	−7.20242
−7.16924	−7.02406	−6.90495	−6.55726	−6.44467	−6.32369	−6.30484	−6.26650
−7.25451	−7.24397	−7.23745	−7.21854	−7.20743	−7.17173	−7.15179	−7.09259
−7.05870	−6.90877	−6.78767	−6.45439	−6.35445	−6.25052	−6.23463	−6.20239
−7.17174	−7.16179	−7.15578	−7.13749	−7.12675	−7.09280	−7.07300	−7.01384
−6.98054	−6.82795	−6.70689	−6.39432	−6.30528	−6.21484	−6.20119	−6.17351
−7.08965	−7.08002	−7.07486	−7.05770	−7.04760	−7.01575	−6.99713	−6.94172
−6.90855	−6.75400	−6.63306	−6.32356	−6.23922	−6.15650	−6.14421	−6.11933
−7.07385	−7.06515	−7.05986	−7.04361	−7.03395	−7.00271	−6.98421	−6.92939
−6.89775	−6.74811	−6.62650	−6.31135	−6.22480	−6.14178	−6.12902	−6.10285
−7.07425	−7.06595	−7.06085	−7.04488	−7.03541	−7.00406	−6.98518	−6.93296
−6.90084	−6.75539	−6.63276	−6.30253	−6.21119	−6.12364	−6.11077	−6.08467
−7.08025	−7.07207	−7.06731	−7.05162	−7.04228	−7.01161	−6.99341	−6.94135
−6.90942	−6.76764	−6.64647	−6.31153	−6.21755	−6.12735	−6.11420	−6.08759
−7.08856	−7.08045	−7.07595	−7.06047	−7.05128	−7.02153	−7.00403	−6.95124
−6.92045	−6.78195	−6.66301	−6.32780	−6.23238	−6.14037	−6.12687	−6.09952
−7.09786	−7.08989	−7.08546	−7.07004	−7.06106	−7.03198	−7.01449	−6.96152
−6.93240	−6.79697	−6.67970	−6.34291	−6.24606	−6.15183	−6.13804	−6.11015
−7.11722	−7.10946	−7.10500	−7.08977	−7.08110	−7.05274	−7.03497	−6.98204
−6.95477	−6.82603	−6.71140	−6.37063	−6.27062	−6.17173	−6.15729	−6.12816
−7.12675	−7.11899	−7.11453	−7.09954	−7.09094	−7.06275	−7.04511	−6.99204
−6.96462	−6.83949	−6.72615	−6.38416	−6.28248	−6.18153	−6.16670	−6.13675
−7.24940	−7.24133	−7.23769	−7.22501	−7.21694	−7.19156	−7.17585	−7.12623
−7.09986	−6.99671	−6.90106	−6.55594	−6.43335	−6.30549	−6.28606	−6.24661
−7.31248	−7.30353	−7.30066	−7.28868	−7.28105	−7.25724	−7.24248	−7.19388
−7.16783	−7.07375	−6.98770	−6.64254	−6.51062	−6.36715	−6.34503	−6.30017
−7.35474	−7.34522	−7.34286	−7.33134	−7.32399	−7.30122	−7.28710	−7.23916
−7.21331	−7.12521	−7.04549	−6.70030	−6.56223	−6.40847	−6.38459	−6.33616
−7.39996	−7.38983	−7.38800	−7.37697	−7.36993	−7.34826	−7.33480	−7.28757
−7.26194	−7.18017	−7.10717	−6.76194	−6.61736	−6.45270	−6.42694	−6.37473
−7.54077	−7.52876	−7.52858	−7.51905	−7.51296	−7.49466	−7.48327	−7.43822
−7.41325	−7.35100	−7.29866	−6.95334	−6.78870	−6.59044	−6.55892	−6.49507
−7.60665	−7.59377	−7.59436	−7.58554	−7.57988	−7.56315	−7.55272	−7.50868
−7.48403	−7.43085	−7.38812	−7.04274	−6.86878	−6.65491	−6.62070	−6.55144
−7.65012	−7.63666	−7.63775	−7.62940	−7.62403	−7.60833	−7.59853	−7.55516
−7.53071	−7.48351	−7.44711	−7.10171	−6.92160	−6.69744	−6.66147	−6.58864
−7.69625	−7.68218	−7.68380	−7.67593	−7.67087	−7.65627	−7.64714	−7.60448
−7.58025	−7.53938	−7.50969	−7.16425	−6.97763	−6.74257	−6.70472	−6.62811
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−17.96521	−17.62622	−17.50277	−17.25068	−17.15327	−16.93881	−16.84967	−16.64611
−16.55687	−16.34449	−16.24768	−16.00229	−15.88501	−15.56375	−15.40304	−15.02543
−15.09407	−14.74480	−14.61884	−14.36415	−14.26644	−14.05450	−13.96706	−13.77124

(continued on next page)

Table 5 (*continued*)

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
−13.68641	−13.48597	−13.39670	−13.17476	−13.07124	−12.79443	−12.65705	−12.33438
−12.79266	−12.42601	−12.29486	−12.03651	−11.93762	−11.72740	−11.64158	−11.44893
−11.36812	−11.17604	−11.09241	−10.88876	−10.79526	−10.55412	−10.43766	−10.16469
−11.84861	−11.46857	−11.33390	−11.07000	−10.97049	−10.75903	−10.67315	−10.48188
−10.40125	−10.21458	−10.13240	−9.93702	−9.84837	−9.62106	−9.51314	−9.26054
−11.15694	−10.76227	−10.62390	−10.35219	−10.25075	−10.03894	−9.95258	−9.76083
−9.68052	−9.49645	−9.41678	−9.22558	−9.13950	−8.92286	−8.82153	−8.58464
−10.18770	−9.74161	−9.58688	−9.28894	−9.18089	−8.95726	−8.86868	−8.67427
−8.59254	−8.40761	−8.32846	−8.13914	−8.05522	−7.84648	−7.74993	−7.52443
−10.04662	−9.57807	−9.41237	−9.09998	−8.98768	−8.75831	−8.66750	−8.46960
−8.38739	−8.19949	−8.11869	−7.92620	−7.84148	−7.62896	−7.52807	−7.29188
−10.01178	−9.52714	−9.35487	−9.03120	−8.91524	−8.68257	−8.58991	−8.38979
−8.30662	−8.11744	−8.03589	−7.83977	−7.75318	−7.53672	−7.43288	−7.18951
−10.00080	−9.50593	−9.32755	−8.99192	−8.87236	−8.63323	−8.54051	−8.33712
−8.25312	−8.06215	−7.98004	−7.78158	−7.69323	−7.47024	−7.36284	−7.11110
−9.79104	−9.43814	−9.28100	−8.95725	−8.83802	−8.59729	−8.50257	−8.29803
−8.21304	−8.01897	−7.93518	−7.73187	−7.64099	−7.40801	−7.29540	−7.03139
−9.44028	−9.26463	−9.16028	−8.90312	−8.79837	−8.57554	−8.48649	−8.29017
−8.20736	−8.01522	−7.93179	−7.73152	−7.63883	−7.40225	−7.28615	−7.01355
−9.18798	−9.09160	−9.02520	−8.83115	−8.74305	−8.54868	−8.46646	−8.28201
−8.20298	−8.01660	−7.93436	−7.73675	−7.64362	−7.40706	−7.28955	−7.01333
−9.01662	−8.95519	−8.91024	−8.76162	−8.68878	−8.51827	−8.44412	−8.27243
−8.19744	−8.01860	−7.93863	−7.74273	−7.65201	−7.41466	−7.29720	−7.02131
−8.89604	−8.85117	−8.81790	−8.70036	−8.63973	−8.48861	−8.42204	−8.26238
−8.19131	−8.02019	−7.94297	−7.74960	−7.66126	−7.42374	−7.30683	−7.03248
−8.80601	−8.77078	−8.74447	−8.64831	−8.59648	−8.46206	−8.40151	−8.25249
−8.18508	−8.02108	−7.94654	−7.75733	−7.66972	−7.43377	−7.31738	−7.04420
−8.68156	−8.65741	−8.63880	−8.56835	−8.52766	−8.41843	−8.36660	−8.23507
−8.17395	−8.02191	−7.95158	−7.77136	−7.68467	−7.45351	−7.33833	−7.06770
−8.63732	−8.61687	−8.60068	−8.53807	−8.50103	−8.40073	−8.35218	−8.22785
−8.16937	−8.02228	−7.95346	−7.77705	−7.69156	−7.46269	−7.34823	−7.07921
−8.33547	−8.33157	−8.32790	−8.30664	−8.29266	−8.25096	−8.22718	−8.16119
−8.12696	−8.03300	−7.98628	−7.85112	−7.78265	−7.58398	−7.48212	−7.24245
−8.24642	−8.24684	−8.24706	−8.23642	−8.22956	−8.21113	−8.19614	−8.15379
−8.12996	−8.06074	−8.02595	−7.91060	−7.85038	−7.66506	−7.57322	−7.35793
−8.19634	−8.19962	−8.20239	−8.19875	−8.19657	−8.19348	−8.18427	−8.15750
−8.14052	−8.08760	−8.06067	−7.95836	−7.90358	−7.72705	−7.64180	−7.44257
−8.14822	−8.15451	−8.15999	−8.16377	−8.16656	−8.17973	−8.17664	−8.16639
−8.15666	−8.12103	−8.10242	−8.01394	−7.96493	−7.79772	−7.71946	−7.53726
−8.01826	−8.03386	−8.04769	−8.07431	−8.09240	−8.15564	−8.17143	−8.21204
−8.22468	−8.24226	−8.24931	−8.20343	−8.17217	−8.03366	−7.97694	−7.84718
−7.96277	−7.98270	−8.00041	−8.03766	−8.06286	−8.14938	−8.17395	−8.23821
−8.26125	−8.30357	−8.32255	−8.29647	−8.27348	−8.14831	−8.10161	−7.99623
−7.92709	−7.94986	−7.97013	−8.01438	−8.04427	−8.14611	−8.17646	−8.25630
−8.28619	−8.34481	−8.37165	−8.35862	−8.34106	−8.22468	−8.18458	−8.09527
−7.88975	−7.91554	−7.93852	−7.99019	−8.02504	−8.14315	−8.17963	−8.27598
−8.31313	−8.38903	−8.42420	−8.42499	−8.41320	−8.30614	−8.27303	−8.20074
----------------------------------/		IPRT = 1	/ IGRD = 1	/-----------------/	Z1 = 2	/ DATE = 11/11/02	
−71.09500	−71.09508	−71.09513	−71.09528	−71.09536	−71.09563	−71.09579	−71.09631
−71.09664	−71.09784	−71.09866	−71.10037	−71.08101	−70.87134	−70.75451	−70.60785
−71.77141	−71.77110	−71.77094	−71.77039	−71.77010	−71.76910	−71.76852	−71.76660
−71.76536	−71.76061	−71.75726	−71.74477	−71.74115	−71.75208	−71.71675	−71.65785
−72.87454	−72.87511	−72.87542	−72.87644	−72.87697	−72.87884	−72.87992	−72.88351
−72.88583	−72.89462	−72.90080	−72.92323	−72.93415	−72.95008	−72.95477	−72.97205
−56.41000	−56.40235	−56.39810	−56.38434	−56.37704	−56.35183	−56.33711	−56.28764
−56.25468	−56.12266	−56.02392	−55.64926	−55.45563	−55.11036	−55.01977	−54.73813
−42.27060	−42.26663	−42.26410	−42.25728	−42.25284	−42.23990	−42.23144	−42.20008
−42.17480	−42.03787	−41.90697	−41.33267	−40.99638	−40.21447	−39.92047	−39.35729
−20.01157	−20.01176	−20.01184	−20.00948	−20.00977	−20.00875	−20.00781	−20.00259
−19.99778	−19.95793	−19.90793	−19.62091	−19.43541	−19.01106	−18.84622	−18.53827
−15.51359	−15.51359	−15.51368	−15.51348	−15.51291	−15.51273	−15.51216	−15.50949
−15.50655	−15.48381	−15.45429	−15.27524	−15.15342	−14.85320	−14.73464	−14.51469
−13.55622	−13.55594	−13.55471	−13.55445	−13.55446	−13.55451	−13.55458	−13.55200

Table 5 (*continued*)

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
−13.54991	−13.53550	−13.51445	−13.38883	−13.29864	−13.06482	−12.97023	−12.79582
−12.06283	−12.06261	−12.06248	−12.06253	−12.06254	−12.06251	−12.06248	−12.06181
−12.05929	−12.05131	−12.03591	−11.95208	−11.88692	−11.70907	−11.63644	−11.50190
−10.26883	−10.26887	−10.26886	−10.26785	−10.26790	−10.26795	−10.26806	−10.26677
−10.26523	−10.25869	−10.25348	−10.21308	−10.18070	−10.08449	−10.04260	−9.96189
−9.63603	−9.63606	−9.63614	−9.63525	−9.63532	−9.63534	−9.63481	−9.63352
−9.63213	−9.62770	−9.62415	−9.59789	−9.57669	−9.51006	−9.47996	−9.41994
−9.30728	−9.30729	−9.30718	−9.30585	−9.30575	−9.30525	−9.30451	−9.30293
−9.30227	−9.29921	−9.29600	−9.27585	−9.26067	−9.21050	−9.18767	−9.13661
−9.10260	−9.10253	−9.10219	−9.10194	−9.10162	−9.10081	−9.10046	−9.09914
−9.09821	−9.09525	−9.09258	−9.07704	−9.06474	−9.02427	−9.00590	−8.95956
−8.96231	−8.96226	−8.96207	−8.96210	−8.96193	−8.96179	−8.96180	−8.95898
−8.95878	−8.95501	−8.95300	−8.94115	−8.93095	−8.89688	−8.88004	−8.83829
−8.86011	−8.86012	−8.86013	−8.86015	−8.86018	−8.86030	−8.86047	−8.85673
−8.85704	−8.85305	−8.85137	−8.84201	−8.83328	−8.80366	−8.78773	−8.75003
−8.72143	−8.72147	−8.72152	−8.72174	−8.72185	−8.72024	−8.72036	−8.71877
−8.71804	−8.71610	−8.71396	−8.70670	−8.69938	−8.67535	−8.66238	−8.63005
−8.67219	−8.67223	−8.67224	−8.67240	−8.67250	−8.67021	−8.67030	−8.66980
−8.66858	−8.66757	−8.66516	−8.65846	−8.65159	−8.62943	−8.61781	−8.58726
−8.37373	−8.37284	−8.37287	−8.37304	−8.37301	−8.37285	−8.37203	−8.37186
−8.37107	−8.37038	−8.36941	−8.36573	−8.36344	−8.35406	−8.34772	−8.32669
−8.32514	−8.32505	−8.32506	−8.32509	−8.32513	−8.32409	−8.32410	−8.32400
−8.32345	−8.32221	−8.32167	−8.31902	−8.31745	−8.31054	−8.30480	−8.28679
−8.31416	−8.31408	−8.31408	−8.31412	−8.31416	−8.31310	−8.31314	−8.31305
−8.31252	−8.31121	−8.31069	−8.30928	−8.30775	−8.30131	−8.29691	−8.27950
−8.31727	−8.31624	−8.31628	−8.31632	−8.31633	−8.31626	−8.31630	−8.31535
−8.31537	−8.31421	−8.31370	−8.31240	−8.31133	−8.30597	−8.30198	−8.28554
−8.35483	−8.35042	−8.35062	−8.35070	−8.35060	−8.35424	−8.35444	−8.35014
−8.35237	−8.35149	−8.35133	−8.34878	−8.34978	−8.34859	−8.34446	−8.33171
−8.37809	−8.37212	−8.37238	−8.37249	−8.37233	−8.37770	−8.37798	−8.37211
−8.37537	−8.37463	−8.37464	−8.37150	−8.37347	−8.37421	−8.37001	−8.35898
−8.39443	−8.38741	−8.38773	−8.38785	−8.38766	−8.39416	−8.39449	−8.38760
−8.39153	−8.39087	−8.39100	−8.38747	−8.39007	−8.39209	−8.38785	−8.37795
−8.41232	−8.40421	−8.40458	−8.40471	−8.40448	−8.41220	−8.41257	−8.40459
−8.40924	−8.40868	−8.40892	−8.40499	−8.40826	−8.41163	−8.40735	−8.39864
---------------------------------	---------------------------------/	IPRT = 1	/ IGRD = 2	/-----------------/	Z1 = 2	/ DATE = 11/11/02	
−41.41436	−41.11139	−40.99147	−40.72172	−40.60415	−40.31846	−40.18368	−39.82847
−39.65323	−39.17990	−38.94638	−38.36558	−38.12860	−37.72636	−37.63003	−37.52414
−30.46299	−30.17734	−30.06527	−29.81599	−29.70967	−29.45782	−29.34089	−29.04328
−28.89787	−28.50741	−28.31358	−27.81565	−27.59818	−27.16622	−27.01709	−26.76855
−21.86569	−21.64671	−21.55421	−21.34488	−21.25367	−21.03788	−20.93982	−20.69355
−20.57671	−20.26591	−20.11407	−19.70653	−19.50619	−18.96736	−18.71938	−18.24884
−18.04791	−17.89644	−17.82693	−17.65747	−17.58176	−17.39754	−17.31243	−17.09774
−16.99550	−16.72526	−16.59107	−16.21748	−16.01626	−15.42577	−15.14964	−14.62272
−15.07719	−14.99065	−14.94580	−14.83119	−14.77577	−14.63264	−14.56457	−14.38710
−14.30092	−14.06650	−13.94575	−13.58378	−13.37321	−12.76033	−12.48356	−11.94847
−10.20794	−10.19444	−10.18395	−10.15588	−10.14051	−10.09519	−10.07118	−9.99646
−9.95378	−9.80204	−9.69916	−9.30747	−9.08678	−8.60736	−8.43414	−8.13048
−9.19778	−9.18810	−9.18279	−9.16564	−9.15630	−9.12777	−9.11158	−9.05938
−9.02691	−8.90458	−8.81330	−8.46026	−8.26636	−7.86059	−7.72027	−7.49332
−8.75037	−8.74316	−8.73894	−8.72512	−8.71850	−8.69533	−8.68283	−8.64275
−8.61559	−8.50694	−8.42489	−8.09696	−7.91685	−7.54306	−7.41930	−7.22803
−8.40699	−8.40228	−8.39923	−8.38862	−8.38284	−8.36531	−8.35547	−8.32076
−8.29803	−8.20336	−8.12855	−7.82641	−7.65645	−7.30716	−7.19596	−7.03463
−7.99909	−7.99719	−7.99485	−7.98823	−7.98399	−7.97143	−7.96339	−7.93978
−7.92257	−7.84501	−7.78260	−7.51598	−7.36346	−7.05163	−6.95755	−6.83196
−7.86378	−7.86075	−7.85884	−7.85387	−7.85004	−7.84076	−7.83347	−7.81308
−7.79787	−7.72776	−7.67118	−7.42230	−7.27573	−6.97555	−6.88707	−6.77321
−7.79899	−7.79596	−7.79439	−7.79020	−7.78711	−7.77752	−7.77159	−7.75234
−7.73780	−7.67402	−7.62099	−7.38418	−7.24168	−6.94778	−6.86077	−6.75274
−7.76156	−7.76109	−7.75954	−7.75565	−7.75282	−7.74224	−7.73675	−7.71906
−7.70483	−7.64534	−7.59460	−7.36602	−7.22654	−6.93612	−6.84920	−6.74494

(*continued on next page*)

Table 5 (*continued*)

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
−7.74026	−7.73857	−7.73716	−7.73347	−7.73073	−7.72193	−7.71671	−7.69843
−7.68565	−7.62697	−7.57732	−7.35446	−7.21723	−6.92937	−6.84454	−6.74018
−7.72726	−7.72405	−7.72275	−7.71918	−7.71647	−7.70967	−7.70458	−7.68573
−7.67413	−7.61624	−7.56760	−7.34978	−7.21436	−6.92788	−6.84477	−6.73939
−7.71244	−7.71068	−7.70933	−7.70581	−7.70316	−7.69686	−7.69173	−7.67464
−7.66308	−7.61063	−7.56495	−7.35720	−7.22476	−6.93806	−6.85422	−6.74867
−7.70868	−7.70801	−7.70663	−7.70310	−7.70048	−7.69381	−7.68876	−7.67264
−7.66100	−7.61114	−7.56689	−7.36352	−7.23235	−6.94519	−6.86046	−6.75485
−7.74190	−7.74167	−7.74140	−7.73734	−7.73451	−7.73042	−7.72600	−7.71413
−7.70453	−7.66627	−7.63236	−7.46883	−7.35221	−7.06237	−6.97069	−6.85114
−7.78672	−7.78655	−7.78474	−7.78364	−7.78014	−7.77558	−7.77246	−7.76082
−7.75189	−7.71898	−7.68980	−7.54228	−7.43368	−7.14280	−7.04460	−6.91480
−7.82625	−7.82268	−7.82302	−7.81920	−7.81768	−7.81342	−7.81025	−7.79863
−7.79289	−7.75915	−7.73376	−7.59736	−7.49406	−7.20172	−7.09951	−6.96283
−7.86895	−7.86854	−7.86878	−7.86446	−7.86279	−7.85848	−7.85672	−7.84388
−7.83723	−7.80938	−7.78444	−7.65926	−7.56175	−7.27095	−7.16378	−7.01713
−7.99961	−8.01635	−8.01264	−8.01062	−8.00564	−8.00075	−8.00523	−7.98713
−7.97265	−7.97073	−7.94367	−7.85219	−7.77270	−7.48978	−7.36658	−7.18663
−8.06036	−8.08508	−8.07953	−8.07858	−8.07206	−8.06691	−8.07429	−8.05374
−8.03562	−8.04576	−8.01771	−7.94189	−7.87078	−7.59153	−7.46087	−7.26544
−8.10038	−8.13035	−8.12359	−8.12335	−8.11581	−8.11048	−8.11977	−8.09761
−8.07710	−8.09518	−8.06648	−8.00098	−7.93539	−7.65856	−7.52298	−7.31735
−8.14279	−8.17834	−8.17030	−8.17080	−8.16219	−8.15667	−8.16799	−8.14412
−8.12106	−8.14756	−8.11817	−8.06362	−8.00387	−7.72960	−7.58882	−7.37239
--------------------------------/		IPRT = 1	/ IGRD = 1	/-----------------/	Z1 = 3	/ DATE = 11/11/02	
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−71.34712	−71.34460	−71.34312	−71.33917	−71.33738	−71.33313	−71.33124	−71.32666
−71.32462	−71.31945	−71.31701	−71.31083	−71.30813	−71.30235	−71.30257	−71.29241
−73.20636	−73.21595	−73.22162	−73.23666	−73.24349	−73.25968	−73.26688	−73.28433
−73.29210	−73.31178	−73.32110	−73.34455	−73.35519	−73.37587	−73.37964	−73.38007
−62.95294	−62.88443	−62.84372	−62.73496	−62.68539	−62.56706	−62.51433	−62.38653
−62.32932	−62.18464	−62.11611	−61.94331	−61.86400	−61.70430	−61.66452	−61.64684
−27.42623	−27.40367	−27.38765	−27.33662	−27.30947	−27.23430	−27.19646	−27.09621
−27.04795	−26.92007	−26.85734	−26.69325	−26.61344	−26.40140	−26.29101	−25.95212
−20.15246	−20.14297	−20.13573	−20.10907	−20.09420	−20.05174	−20.02911	−19.96660
−19.93481	−19.84852	−19.80467	−19.68727	−19.62860	−19.46890	−19.38369	−19.11866
−17.03266	−17.02612	−17.02115	−17.00286	−16.99213	−16.95987	−16.94291	−16.89533
−16.87036	−16.80156	−16.76604	−16.66961	−16.62252	−16.49339	−16.42376	−16.21337
−14.67630	−14.67142	−14.66791	−14.65471	−14.64704	−14.62370	−14.61103	−14.57612
−14.55750	−14.50477	−14.47726	−14.39931	−14.36100	−14.25817	−14.20279	−14.03594
−11.87593	−11.87396	−11.87246	−11.86602	−11.86180	−11.84872	−11.84224	−11.82260
−11.81110	−11.77960	−11.76287	−11.71471	−11.69037	−11.62464	−11.59020	−11.48575
−10.91604	−10.91396	−10.91234	−10.90879	−10.90612	−10.89681	−10.89238	−10.87778
−10.86929	−10.84633	−10.83375	−10.79700	−10.77826	−10.72864	−10.70303	−10.62355
−10.42424	−10.42297	−10.42179	−10.41855	−10.41623	−10.40931	−10.40583	−10.39394
−10.38736	−10.36832	−10.35780	−10.32760	−10.31209	−10.27144	−10.25034	−10.18412
−10.12228	−10.12158	−10.12096	−10.11824	−10.11624	−10.11054	−10.10737	−10.09724
−10.09226	−10.07592	−10.06674	−10.04010	−10.02677	−9.99228	−9.97327	−9.91516
−9.91770	−9.91717	−9.91665	−9.91412	−9.91251	−9.90737	−9.90448	−9.89570
−9.89140	−9.87681	−9.86902	−9.84504	−9.83312	−9.80272	−9.78562	−9.73402
−9.76963	−9.76911	−9.76849	−9.76586	−9.76461	−9.75981	−9.75722	−9.74950
−9.74531	−9.73191	−9.72537	−9.70374	−9.69278	−9.66507	−9.64985	−9.60364
−9.56808	−9.56789	−9.56760	−9.56481	−9.56390	−9.55991	−9.55768	−9.55141
−9.54747	−9.53599	−9.53046	−9.51267	−9.50327	−9.47863	−9.46578	−9.42637
−9.49620	−9.49623	−9.49622	−9.49352	−9.49265	−9.48908	−9.48693	−9.48114
−9.47746	−9.46680	−9.46133	−9.44496	−9.43619	−9.41257	−9.40040	−9.36306
−9.05792	−9.05780	−9.05766	−9.05693	−9.05645	−9.05442	−9.05332	−9.04963
−9.04802	−9.04273	−9.03963	−9.02978	−9.02462	−9.00850	−9.00097	−8.98044
−8.97529	−8.97525	−8.97521	−8.97515	−8.97498	−8.97503	−8.97343	−8.97074
−8.96975	−8.96370	−8.96180	−8.95287	−8.94780	−8.93747	−8.93048	−8.91053

Table 5 (*continued*)

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
−8.94754	−8.94753	−8.94754	−8.94762	−8.94753	−8.94807	−8.94645	−8.94396
−8.94305	−8.93720	−8.93509	−8.92922	−8.92574	−8.91338	−8.90686	−8.88947
−8.93886	−8.93883	−8.93882	−8.93886	−8.93873	−8.93918	−8.93725	−8.93498
−8.93407	−8.92785	−8.92575	−8.92111	−8.91808	−8.90645	−8.90121	−8.88420
−8.96429	−8.96429	−8.96429	−8.96429	−8.96428	−8.96434	−8.96413	−8.96082
−8.96010	−8.95543	−8.95665	−8.94977	−8.94628	−8.94089	−8.93821	−8.92040
−8.98682	−8.98680	−8.98680	−8.98685	−8.98676	−8.98718	−8.98563	−8.98276
−8.98224	−8.97433	−8.97919	−8.97032	−8.96679	−8.96604	−8.96622	−8.94372
−9.00330	−9.00327	−9.00326	−9.00334	−9.00319	−9.00386	−9.00143	−8.99884
−8.99846	−8.98842	−8.99567	−8.98548	−8.98193	−8.98423	−8.98631	−8.96071
−9.02170	−9.02166	−9.02165	−9.02176	−9.02155	−9.02249	−9.01911	−9.01683
−9.01659	−9.00429	−9.01408	−9.00249	−8.99893	−9.00446	−9.00855	−8.97966

Table 6
Effective Q coefficient data for all ion stages of Li. See page 821 for Explanation of Tables

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
8.00000	8.69897	9.00000	9.69897	10.00000	10.69897	11.00000	11.69897
12.00000	12.69897	13.00000	13.69897	14.00000	14.69897	15.00000	15.69897
−0.69877	−0.52268	−0.30083	−0.15470	0.00020	0.47732	0.69917	0.84530
1.00020	1.30123	1.47732	1.60226	1.69917	1.77835	1.84530	1.95444
2.00020	2.47732	2.69917	2.84530	3.00020	3.47732	3.69917	3.84530
4.00020							
--------------------------------	-/	IGRD = 2	/ JGRD = 1	/-----------------/	Z1 = 2	/ DATE = 11/11/02	
−8.10920	−8.10920	−8.10920	−8.10920	−8.10920	−8.10920	−8.10920	−8.10920
−8.10919	−8.10918	−8.10916	−8.10919	−8.10919	−8.10936	−8.10953	−8.11189
−8.18148	−8.18148	−8.18148	−8.18148	−8.18148	−8.18149	−8.18149	−8.18147
−8.18151	−8.18163	−8.18174	−8.18143	−8.18145	−8.18136	−8.18160	−8.18373
−8.24526	−8.24526	−8.24526	−8.24526	−8.24525	−8.24524	−8.24523	−8.24522
−8.24479	−8.24273	−8.24054	−8.23046	−8.22392	−8.21370	−8.21226	−8.21750
−8.21684	−8.21684	−8.21684	−8.21684	−8.21683	−8.21685	−8.21687	−8.21586
−8.21503	−8.20809	−8.19980	−8.15823	−8.13406	−8.09375	−8.08696	−8.09218
−8.12395	−8.12394	−8.12394	−8.12385	−8.12350	−8.12343	−8.12341	−8.12187
−8.11969	−8.10505	−8.08833	−8.00643	−7.95828	−7.87834	−7.86557	−7.86564
−7.92251	−7.92252	−7.92251	−7.92246	−7.92240	−7.92162	−7.91872	−7.91833
−7.91346	−7.88862	−7.86151	−7.72369	−7.63967	−7.49343	−7.46249	−7.44712
−7.93978	−7.93977	−7.93977	−7.93978	−7.93979	−7.93993	−7.93999	−7.93522
−7.93364	−7.90601	−7.87721	−7.73502	−7.64620	−7.48534	−7.45408	−7.44363
−7.98571	−7.98569	−7.98569	−7.98569	−7.98568	−7.98560	−7.98551	−7.98475
−7.97973	−7.95475	−7.92742	−7.78022	−7.68972	−7.52867	−7.49858	−7.49727
−8.06428	−8.06409	−8.06407	−8.06409	−8.06411	−8.06345	−8.06319	−8.06100
−8.05740	−8.03262	−8.00582	−7.85896	−7.76941	−7.60834	−7.58170	−7.59087
−8.27287	−8.27527	−8.27551	−8.27554	−8.27553	−8.27548	−8.27499	−8.27298
−8.26969	−8.24615	−8.22024	−8.08414	−7.99862	−7.84948	−7.83063	−7.85981
−8.42768	−8.43094	−8.43082	−8.43074	−8.43072	−8.43050	−8.42964	−8.42766
−8.42441	−8.40312	−8.37798	−8.24628	−8.16287	−8.01931	−8.00304	−8.03973
−8.54942	−8.55178	−8.55174	−8.55171	−8.55170	−8.55161	−8.55108	−8.54830
−8.54575	−8.52546	−8.50131	−8.37370	−8.29186	−8.15127	−8.13629	−8.17634
−8.65037	−8.65042	−8.65043	−8.65045	−8.65045	−8.65052	−8.65055	−8.64773
−8.64567	−8.62490	−8.60189	−8.47874	−8.39742	−8.25827	−8.24394	−8.28601
−8.73175	−8.73379	−8.73375	−8.73371	−8.73371	−8.73374	−8.73382	−8.73224
−8.72960	−8.70889	−8.68677	−8.56753	−8.48710	−8.34810	−8.33419	−8.37742
−8.80207	−8.80605	−8.80594	−8.80588	−8.80587	−8.80582	−8.80578	−8.80537
−8.80220	−8.78191	−8.76080	−8.64408	−8.56476	−8.42572	−8.41203	−8.45562
−8.92525	−8.92710	−8.92699	−8.92705	−8.92704	−8.92699	−8.92693	−8.92689
−8.92416	−8.90489	−8.88620	−8.77135	−8.69409	−8.55565	−8.54171	−8.58457
−8.97860	−8.97903	−8.97900	−8.97904	−8.97904	−8.97901	−8.97898	−8.97876
−8.97633	−8.95766	−8.93986	−8.82594	−8.74952	−8.61124	−8.59682	−8.63924
−9.54736	−9.54793	−9.54882	−9.54911	−9.54912	−9.54911	−9.54909	−9.54862
−9.54653	−9.53468	−9.52035	−9.43164	−9.36382	−9.21717	−9.19513	−9.23147
−9.81918	−9.82383	−9.82356	−9.82343	−9.82342	−9.82356	−9.82371	−9.82021
−9.82059	−9.81112	−9.79795	−9.72122	−9.65883	−9.51121	−9.48457	−9.51487
−10.00909	−10.00009	−10.00277	−10.00327	−10.00330	−10.00329	−10.00324	−10.00276
−9.99998	−9.99237	−9.98069	−9.91223	−9.85629	−9.70717	−9.67840	−9.70342
−10.18634	−10.18735	−10.18828	−10.18836	−10.18793	−10.18784	−10.18782	−10.18773
−10.18690	−10.17941	−10.17056	−10.11210	−10.06043	−9.91780	−9.88403	−9.90440
−10.90125	−10.90250	−10.90338	−10.90345	−10.90301	−10.90292	−10.90291	−10.90280
−10.90202	−10.89452	−10.88571	−10.82738	−10.77575	−10.63323	−10.59938	−10.61971
−11.23403	−11.23527	−11.23615	−11.23623	−11.23579	−11.23569	−11.23568	−11.23558
−11.23480	−11.22730	−11.21849	−11.16016	−11.10852	−10.96600	−10.93216	−10.95248
−11.45322	−11.45446	−11.45535	−11.45542	−11.45498	−11.45489	−11.45487	−11.45477
−11.45399	−11.44649	−11.43768	−11.37935	−11.32771	−11.18519	−11.15135	−11.17167
−11.68557	−11.68682	−11.68770	−11.68777	−11.68733	−11.68724	−11.68722	−11.68712
−11.68634	−11.67884	−11.67003	−11.61170	−11.56007	−11.41755	−11.38370	−11.40403
--------------------------------	-/	IGRD = 1	/ JGRD = 2	/-----------------/	Z1 = 2	/ DATE = 11/11/02	
−71.87293	−71.87295	−71.87301	−71.87298	−71.87300	−71.87300	−71.87300	−71.87300
−71.87300	−71.87300	−71.87300	−71.87302	−71.87303	−71.87319	−71.87337	−71.87570
−72.93172	−72.93162	−72.93121	−72.93136	−72.93129	−72.93124	−72.93124	−72.93123

Table 6 (*continued*)

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
−72.93123	−72.93124	−72.93125	−72.93125	−72.93127	−72.93146	−72.93164	−72.93394
−58.91269	−58.91288	−58.91366	−58.91339	−58.91352	−58.91362	−58.91362	−58.91362
−58.91362	−58.91362	−58.91359	−58.91364	−58.91364	−58.91376	−58.91393	−58.91630
−44.47119	−44.46883	−44.45907	−44.46250	−44.46081	−44.45962	−44.45959	−44.45957
−44.45957	−44.45964	−44.45996	−44.46009	−44.46007	−44.46084	−44.46099	−44.46265
−33.55438	−33.55416	−33.55327	−33.55358	−33.55343	−33.55332	−33.55331	−33.55331
−33.55330	−33.55320	−33.55315	−33.55586	−33.55565	−33.55580	−33.55582	−33.55774
−16.72975	−16.72977	−16.72984	−16.72981	−16.72982	−16.72983	−16.72982	−16.72980
−16.72975	−16.73147	−16.73208	−16.73384	−16.73550	−16.74338	−16.74426	−16.74940
−13.42629	−13.42629	−13.42629	−13.42629	−13.42629	−13.42628	−13.42628	−13.42619
−13.42615	−13.42726	−13.42756	−13.43223	−13.43631	−13.44918	−13.45540	−13.46822
−12.03498	−12.03498	−12.03498	−12.03497	−12.03497	−12.03495	−12.03492	−12.03555
−12.03551	−12.03626	−12.03719	−12.04393	−12.05010	−12.07045	−12.08106	−12.10208
−11.01592	−11.01592	−11.01592	−11.01592	−11.01591	−11.01591	−11.01591	−11.01599
−11.01599	−11.01640	−11.01852	−11.02976	−11.03861	−11.06795	−11.08382	−11.11601
−9.90518	−9.90518	−9.90518	−9.90518	−9.90518	−9.90517	−9.90517	−9.90515
−9.90518	−9.90713	−9.90874	−9.92723	−9.94372	−10.00188	−10.03005	−10.08218
−9.59251	−9.59251	−9.59251	−9.59251	−9.59251	−9.59252	−9.59252	−9.59260
−9.59318	−9.59581	−9.59743	−9.61972	−9.63868	−9.71094	−9.74528	−9.80721
−9.46951	−9.46951	−9.46951	−9.46951	−9.46951	−9.46952	−9.46953	−9.46965
−9.47028	−9.47225	−9.47516	−9.49783	−9.51942	−9.59910	−9.63774	−9.70630
−9.41744	−9.41743	−9.41743	−9.41743	−9.41743	−9.41743	−9.41743	−9.41741
−9.41740	−9.41927	−9.42249	−9.44580	−9.46933	−9.55347	−9.59543	−9.66939
−9.39672	−9.39671	−9.39671	−9.39671	−9.39671	−9.39672	−9.39672	−9.39682
−9.39712	−9.39901	−9.40212	−9.42591	−9.44979	−9.53820	−9.58261	−9.65997
−9.39267	−9.39267	−9.39267	−9.39268	−9.39268	−9.39269	−9.39270	−9.39284
−9.39354	−9.39544	−9.39850	−9.42241	−9.44641	−9.53810	−9.58439	−9.66433
−9.40973	−9.40974	−9.40974	−9.40974	−9.40974	−9.40976	−9.40978	−9.40962
−9.40997	−9.41188	−9.41527	−9.43860	−9.46375	−9.55856	−9.60751	−9.69259
−9.42412	−9.42414	−9.42414	−9.42414	−9.42414	−9.42415	−9.42415	−9.42406
−9.42412	−9.42610	−9.42953	−9.45257	−9.47802	−9.57384	−9.62361	−9.71126
−9.74608	−9.74597	−9.74596	−9.74595	−9.74593	−9.74577	−9.74533	−9.74746
−9.74738	−9.74742	−9.74959	−9.77062	−9.79226	−9.89351	−9.94963	−10.05945
−9.96304	−9.96304	−9.96304	−9.96308	−9.96313	−9.96380	−9.96654	−9.96742
−9.96748	−9.96795	−9.97049	−9.98512	−10.00581	−10.10307	−10.16090	−10.28118
−10.12394	−10.12389	−10.12389	−10.12388	−10.12388	−10.12386	−10.12376	−10.12384
−10.12421	−10.12515	−10.12666	−10.14278	−10.16097	−10.25474	−10.31350	−10.43771
−10.29769	−10.29769	−10.29769	−10.29769	−10.29769	−10.29769	−10.29768	−10.29784
−10.29844	−10.29878	−10.30031	−10.31458	−10.33095	−10.41910	−10.47752	−10.60978
−11.01266	−11.01266	−11.01266	−11.01266	−11.01266	−11.01267	−11.01268	−11.01284
−11.01344	−11.01377	−11.01530	−11.02953	−11.04589	−11.13396	−11.19237	−11.32475
−11.34543	−11.34543	−11.34543	−11.34543	−11.34543	−11.34544	−11.34546	−11.34561
−11.34621	−11.34654	−11.34808	−11.36231	−11.37867	−11.46673	−11.52514	−11.65753
−11.56462	−11.56462	−11.56462	−11.56462	−11.56463	−11.56464	−11.56465	−11.56480
−11.56540	−11.56573	−11.56727	−11.58150	−11.59786	−11.68593	−11.74434	−11.87672
−11.79698	−11.79698	−11.79698	−11.79698	−11.79698	−11.79699	−11.79700	−11.79716
−11.79776	−11.79809	−11.79962	−11.81385	−11.83021	−11.91828	−11.97669	−12.10907

Table 7
Effective X coefficient data for all ion stages of Li. See page 821 for Explanation of Tables

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
8.00000	8.69897	9.00000	9.69897	10.00000	10.69897	11.00000	11.69897
12.00000	12.69897	13.00000	13.69897	14.00000	14.69897	15.00000	15.69897
−0.69877	−0.52268	−0.30083	−0.15470	0.00020	0.47732	0.69917	0.84530
1.00020	1.30123	1.47732	1.60226	1.69917	1.77835	1.84530	1.95444
2.00020	2.47732	2.69917	2.84530	3.00020	3.47732	3.69917	3.84530
4.00020							
--------------------------------/		IPRT = 2	/ JPRT = 1	/-----------------/	Z1 = 1	/ DATE = 11/11/02	
−11.29280	−10.95610	−10.83068	−10.57314	−10.47064	−10.24770	−10.15534	−9.94456
−9.85284	−9.63413	−9.53627	−9.29540	−9.17955	−8.92532	−8.74694	−8.04797
−11.57462	−11.23125	−11.10437	−10.84415	−10.74151	−10.52193	−10.43148	−10.22612
−10.13861	−9.93435	−9.84355	−9.62811	−9.52552	−9.32004	−9.15863	−8.45966
−11.93098	−11.57739	−11.44755	−11.18365	−11.08186	−10.86267	−10.77219	−10.57369
−10.48829	−10.29375	−10.20915	−10.01333	−9.92128	−9.75636	−9.60965	−8.91068
−12.16697	−11.80641	−11.67400	−11.40798	−11.30486	−11.08452	−10.99505	−10.79732
−10.71333	−10.52362	−10.44117	−10.25292	−10.16521	−10.01861	−9.87856	−9.17959
−12.41888	−12.05320	−11.91734	−11.64543	−11.54112	−11.32116	−11.23166	−11.03198
−10.94960	−10.76279	−10.68093	−10.49918	−10.41493	−10.28043	−10.14639	−9.44742
−13.18844	−12.82203	−12.67875	−12.39036	−12.28128	−12.05172	−11.95977	−11.76014
−11.67593	−11.48671	−11.40760	−11.23090	−11.15043	−11.03760	−10.91055	−10.21158
−13.53743	−13.18279	−13.03679	−12.74046	−12.62866	−12.39650	−12.30334	−12.10015
−12.01588	−11.82492	−11.74477	−11.56816	−11.48817	−11.37754	−11.25340	−10.55443
−13.76269	−13.42083	−13.27459	−12.97251	−12.85943	−12.62477	−12.53031	−12.32492
−12.23960	−12.04919	−11.96862	−11.79111	−11.71083	−11.60089	−11.47658	−10.77761
−13.99675	−13.67281	−13.52664	−13.22105	−13.10610	−12.86752	−12.77273	−12.56475
−12.47868	−12.28702	−12.20618	−12.02763	−11.94624	−11.83711	−11.71288	−11.01391
−14.43966	−14.15761	−14.01559	−13.70686	−13.58780	−13.34227	−13.24566	−13.03592
−12.94888	−12.75317	−12.67059	−12.48995	−12.40840	−12.29697	−12.17322	−11.47425
−14.69336	−14.43889	−14.30318	−13.99335	−13.87158	−13.62337	−13.52486	−13.31227
−13.22499	−13.02779	−12.94603	−12.76232	−12.67987	−12.56769	−12.44320	−11.74423
−14.87173	−14.63691	−14.50544	−14.19702	−14.07469	−13.82247	−13.72312	−13.51011
−13.42262	−13.22537	−13.14237	−12.95708	−12.87395	−12.76138	−12.63607	−11.93710
−15.00760	−14.78903	−14.66187	−14.35509	−14.23272	−13.97807	−13.87873	−13.66366
−13.57597	−13.37906	−13.29503	−13.10977	−13.02626	−12.91200	−12.78683	−12.08786
−15.11772	−14.91267	−14.78949	−14.48459	−14.36180	−14.10585	−14.00643	−13.78976
−13.70188	−13.50437	−13.42004	−13.23505	−13.15129	−13.03514	−12.91009	−12.21112
−15.21118	−15.01712	−14.89717	−14.59454	−14.47078	−14.21391	−14.11388	−13.89745
−13.80940	−13.61001	−13.52602	−13.34074	−13.25678	−13.13931	−13.01376	−12.31479
−15.36356	−15.18682	−15.07217	−14.77408	−14.64894	−14.39041	−14.28939	−14.07328
−13.98497	−13.78315	−13.69979	−13.51301	−13.42891	−13.30975	−13.18315	−12.48418
−15.42711	−15.25755	−15.14528	−14.84919	−14.72401	−14.46462	−14.36354	−14.14646
−14.05804	−13.85646	−13.77303	−13.58543	−13.50137	−13.38153	−13.25477	−12.55580
−16.09699	−15.98206	−15.89287	−15.62385	−15.49929	−15.23235	−15.12804	−14.90533
−14.81596	−14.61395	−14.52879	−14.33957	−14.25438	−14.12914	−14.00008	−13.30111
−16.42976	−16.31484	−16.22564	−15.95662	−15.83207	−15.56512	−15.46081	−15.23810
−15.14873	−14.94672	−14.86156	−14.67234	−14.58715	−14.46191	−14.33285	−13.63388
−16.64896	−16.53403	−16.44484	−16.17581	−16.05126	−15.78432	−15.68001	−15.45729
−15.36792	−15.16591	−15.08075	−14.89153	−14.80635	−14.68110	−14.55205	−13.85308
−16.88131	−16.76638	−16.67719	−16.40817	−16.28361	−16.01667	−15.91236	−15.68964
−15.60027	−15.39826	−15.31311	−15.12389	−15.03870	−14.91345	−14.78440	−14.08543
−17.59699	−17.48206	−17.39287	−17.12385	−16.99929	−16.73235	−16.62804	−16.40533
−16.31596	−16.11395	−16.02879	−15.83957	−15.75438	−15.62914	−15.50008	−14.80111
−17.92976	−17.81484	−17.72564	−17.45662	−17.33207	−17.06512	−16.96081	−16.73810
−16.64873	−16.44672	−16.36156	−16.17234	−16.08715	−15.96191	−15.83285	−15.13388
−18.14896	−18.03403	−17.94484	−17.67581	−17.55126	−17.28432	−17.18001	−16.95729
−16.86792	−16.66591	−16.58075	−16.39153	−16.30635	−16.18110	−16.05205	−15.35308
−18.38131	−18.26638	−18.17719	−17.90817	−17.78361	−17.51667	−17.41236	−17.18964
−17.10027	−16.89826	−16.81311	−16.62389	−16.53870	−16.41345	−16.28440	−15.58543
--------------------------------/		IPRT = 1	/ JPRT = 2	/-----------------/	Z1 = 1	/ DATE = 11/11/02	
−72.00008	−72.00008	−72.00008	−72.00008	−72.00008	−72.00009	−72.00008	−72.00011
−72.00008	−72.00046	−72.00008	−72.00532	−72.00008	−72.07319	−72.00008	−71.30111

Table 7 (*continued*)

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
−71.99997	−71.99997	−71.99997	−71.99997	−71.99997	−71.99997	−71.99997	−72.00000
−71.99997	−72.00035	−71.99997	−72.00521	−71.99997	−72.07308	−71.99997	−71.30100
−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00001	−72.00000	−72.00003
−72.00000	−72.00038	−72.00000	−72.00524	−72.00000	−72.07311	−72.00000	−71.30103
−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00003
−72.00000	−72.00037	−72.00000	−72.00524	−72.00000	−72.07311	−72.00000	−71.30103
−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00003
−72.00000	−72.00038	−72.00000	−72.00524	−72.00000	−72.07311	−72.00000	−71.30103
−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00003
−72.00000	−72.00038	−72.00000	−72.00524	−72.00000	−72.07311	−72.00000	−71.30103
−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00003
−72.00000	−72.00038	−72.00000	−72.00524	−72.00000	−72.07311	−72.00000	−71.30103
−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00003
−72.00000	−72.00038	−72.00000	−72.00524	−72.00000	−72.07311	−72.00000	−71.30103
−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00000	−72.00003
−72.00000	−72.00037	−72.00000	−72.00524	−72.00000	−72.07311	−72.00000	−71.30103
−71.99999	−71.99999	−71.99999	−71.99999	−71.99999	−71.99999	−71.99999	−72.00002
−71.99999	−72.00036	−71.99999	−72.00523	−71.99999	−72.07310	−71.99999	−71.30102
−72.00005	−72.00005	−72.00005	−72.00005	−72.00005	−72.00005	−72.00005	−72.00007
−72.00005	−72.00042	−72.00005	−72.00529	−72.00005	−72.07316	−72.00005	−71.30108
−72.00005	−72.00005	−72.00005	−72.00005	−72.00005	−72.00006	−72.00005	−72.00008
−72.00005	−72.00043	−72.00005	−72.00529	−72.00005	−72.07316	−72.00005	−71.30108
−71.99984	−71.99984	−71.99984	−71.99984	−71.99984	−71.99985	−71.99984	−71.99987
−71.99984	−72.00022	−71.99984	−72.00508	−71.99984	−72.07295	−71.99984	−71.30087
−71.99998	−71.99998	−71.99998	−71.99998	−71.99998	−71.99999	−71.99998	−72.00001
−71.99998	−72.00036	−71.99998	−72.00522	−71.99998	−72.07309	−71.99998	−71.30101
−72.00057	−72.00057	−72.00057	−72.00057	−72.00057	−72.00057	−72.00057	−72.00060
−72.00057	−72.00095	−72.00057	−72.00581	−72.00057	−72.07368	−72.00057	−71.30160
−71.99941	−71.99941	−71.99941	−71.99941	−71.99941	−71.99941	−71.99941	−71.99944
−71.99941	−71.99978	−71.99941	−72.00465	−71.99941	−72.07252	−71.99941	−71.30044
−71.99773	−71.99773	−71.99773	−71.99773	−71.99773	−71.99773	−71.99773	−71.99775
−71.99773	−71.99810	−71.99773	−72.00296	−71.99773	−72.07084	−71.99773	−71.29876
−72.09699	−72.09699	−72.09699	−72.09699	−72.09699	−72.09699	−72.09699	−72.09702
−72.09699	−72.09737	−72.09699	−72.10223	−72.09699	−72.17010	−72.09699	−71.39802
−72.42976	−72.42976	−72.42976	−72.42976	−72.42976	−72.42977	−72.42976	−72.42979
−72.42976	−72.43014	−72.42976	−72.43500	−72.42976	−72.50287	−72.42976	−71.73079
−72.64896	−72.64896	−72.64896	−72.64896	−72.64896	−72.64896	−72.64896	−72.64898
−72.64896	−72.64933	−72.64896	−72.65419	−72.64896	−72.72207	−72.64896	−71.94999
−72.88131	−72.88131	−72.88131	−72.88131	−72.88131	−72.88131	−72.88131	−72.88134
−72.88131	−72.88168	−72.88131	−72.88655	−72.88131	−72.95442	−72.88131	−72.18234
−73.59699	−73.59699	−73.59699	−73.59699	−73.59699	−73.59699	−73.59699	−73.59702
−73.59699	−73.59737	−73.59699	−73.60223	−73.59699	−73.67010	−73.59699	−72.89802
−73.92976	−73.92976	−73.92976	−73.92976	−73.92976	−73.92977	−73.92976	−73.92979
−73.92976	−73.93014	−73.92976	−73.93500	−73.92976	−74.00000	−73.92976	−73.23079
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−73.44999
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−73.68234

Table 8
Total excitation line power loss data for all ion stages of Li. See page 821 for Explanation of Tables

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
8.00000	8.69897	9.00000	9.69897	10.00000	10.69897	11.00000	11.69897
12.00000	12.69897	13.00000	13.69897	14.00000	14.69897	15.00000	15.69897
−0.69877	−0.52268	−0.30083	−0.15470	0.00020	0.47732	0.69917	0.84530
1.00020	1.30123	1.47732	1.60226	1.69917	1.77835	1.84530	1.95444
2.00020	2.47732	2.69917	2.84530	3.00020	3.47732	3.69917	3.84530
4.00020							
--------------------------------/		IGRD = 1	/ IPRT = 0	/-----------------/	Z1 = 1	/ DATE = 11/11/02	
−28.97637	−28.97637	−28.97637	−28.97637	−28.97637	−28.97638	−28.97637	−28.97720
−28.97822	−28.98349	−28.98996	−29.05263	−29.10058	−29.53014	−29.61103	−28.91206
−27.58581	−27.58581	−27.58581	−27.58581	−27.58581	−27.58580	−27.58581	−27.58656
−27.58741	−27.59440	−27.60136	−27.66718	−27.72045	−28.16756	−28.25367	−27.55470
−26.46031	−26.46031	−26.46031	−26.46031	−26.46031	−26.46031	−26.46030	−26.46133
−26.46240	−26.46943	−26.47732	−26.54837	−26.60811	−27.07992	−27.17306	−26.47409
−25.95926	−25.95926	−25.95926	−25.95926	−25.95926	−25.95922	−25.95928	−25.95946
−25.95974	−25.96801	−25.97542	−26.05356	−26.12012	−26.62154	−26.72240	−26.02343
−25.56716	−25.56716	−25.56716	−25.56716	−25.56716	−25.56708	−25.56707	−25.56734
−25.56768	−25.57585	−25.58469	−25.67796	−25.75832	−26.30375	−26.41543	−25.71646
−24.89534	−24.89534	−24.89534	−24.89533	−24.89534	−24.89531	−24.89521	−24.89769
−24.89994	−24.91348	−24.93610	−25.11107	−25.25427	−25.93171	−26.06583	−25.36686
−24.73846	−24.73846	−24.73846	−24.73844	−24.73846	−24.73820	−24.73848	−24.74189
−24.74321	−24.76323	−24.79015	−25.00758	−25.17359	−25.88803	−26.02795	−25.32898
−24.66913	−24.66913	−24.66913	−24.66912	−24.66913	−24.66906	−24.66912	−24.67125
−24.67394	−24.69739	−24.72928	−24.97355	−25.15206	−25.88371	−26.02555	−25.32658
−24.62159	−24.62159	−24.62159	−24.62160	−24.62159	−24.62165	−24.62159	−24.62362
−24.62732	−24.65366	−24.69168	−24.95872	−25.14710	−25.89087	−26.03377	−25.33480
−24.59099	−24.59099	−24.59099	−24.59098	−24.59099	−24.59093	−24.59097	−24.59296
−24.59552	−24.62262	−24.66176	−24.94151	−25.13803	−25.89140	−26.03640	−25.33743
−24.59972	−24.59972	−24.59972	−24.59973	−24.59972	−24.59977	−24.59979	−24.60073
−24.60314	−24.62638	−24.66192	−24.93856	−25.13477	−25.88864	−26.03389	−25.33492
−24.61219	−24.61219	−24.61219	−24.61219	−24.61219	−24.61211	−24.61227	−24.61450
−24.61593	−24.63402	−24.66548	−24.93039	−25.12516	−25.87789	−26.02323	−25.32426
−24.62513	−24.62513	−24.62513	−24.62511	−24.62513	−24.62483	−24.62491	−24.62739
−24.62803	−24.64448	−24.67360	−24.93144	−25.12370	−25.87517	−26.02003	−25.32106
−24.63787	−24.63787	−24.63787	−24.63786	−24.63787	−24.63764	−24.63785	−24.63959
−24.63979	−24.65605	−24.68370	−24.93690	−25.12658	−25.87660	−26.02087	−25.32190
−24.65011	−24.65012	−24.65011	−24.65013	−24.65011	−24.65035	−24.65107	−24.65169
−24.65177	−24.66741	−24.69372	−24.94184	−25.12945	−25.87769	−26.02158	−25.32261
−24.67121	−24.67121	−24.67121	−24.67125	−24.67121	−24.67203	−24.67321	−24.67287
−24.67336	−24.68626	−24.71059	−24.94784	−25.13211	−25.87633	−26.01975	−25.32078
−24.68034	−24.68035	−24.68034	−24.68038	−24.68034	−24.68103	−24.68192	−24.68196
−24.68280	−24.69400	−24.71770	−24.94974	−25.13245	−25.87463	−26.01788	−25.31891
−24.88480	−24.88480	−24.88480	−24.88480	−24.88480	−24.88480	−24.88480	−24.88473
−24.88480	−24.89194	−24.90666	−25.09202	−25.25563	−25.97630	−26.11699	−25.41802
−25.21758	−25.21758	−25.21758	−25.21758	−25.21758	−25.21757	−25.21758	−25.21750
−25.21758	−25.22471	−25.23943	−25.42480	−25.58840	−26.30908	−26.44976	−25.75079
−25.43677	−25.43677	−25.43677	−25.43677	−25.43677	−25.43676	−25.43677	−25.43669
−25.43677	−25.44390	−25.45862	−25.64399	−25.80760	−26.52827	−26.66895	−25.96998
−25.66912	−25.66912	−25.66912	−25.66912	−25.66912	−25.66912	−25.66912	−25.66904
−25.66912	−25.67625	−25.69098	−25.87634	−26.03995	−26.76062	−26.90130	−26.20233
−26.38480	−26.38480	−26.38480	−26.38480	−26.38480	−26.38480	−26.38480	−26.38473
−26.38480	−26.39194	−26.40666	−26.59202	−26.75563	−27.47630	−27.61699	−26.91802
−26.71758	−26.71758	−26.71758	−26.71758	−26.71758	−26.71757	−26.71758	−26.71750
−26.71758	−26.72471	−26.73943	−26.92480	−27.08840	−27.80908	−27.94976	−27.25079
−26.93677	−26.93677	−26.93677	−26.93677	−26.93677	−26.93676	−26.93677	−26.93669
−26.93677	−26.94390	−26.95862	−27.14399	−27.30760	−28.02827	−28.16895	−27.46998
−27.16912	−27.16912	−27.16912	−27.16912	−27.16912	−27.16912	−27.16912	−27.16904
−27.16912	−27.17625	−27.19098	−27.37634	−27.53995	−28.26062	−28.40130	−27.70233
--------------------------------/		IGRD = 1	/ IPRT = 0	/-----------------/	Z1 = 2	/ DATE = 11/11/02	
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000

Table 8 (*continued*)

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−66.82327	−64.70765	−64.43511	−64.24316	−64.23515	−64.27750
−64.33011	−63.00748	−63.02176	−63.06025	−63.06351	−63.06187	−63.06457	−63.09203
−53.28770	−53.06756	−52.09624	−51.90177	−51.87672	−51.85907	−51.85833	−51.86214
−51.86665	−51.74430	−51.74414	−51.74063	−51.73595	−51.72836	−51.72892	−51.74777
−34.23013	−34.24704	−34.32166	−34.33660	−34.33853	−34.33989	−34.33995	−34.33970
−34.33951	−34.34752	−34.34579	−34.34007	−34.33448	−34.32486	−34.32419	−34.33612
−30.83938	−30.83848	−30.83453	−30.83374	−30.83364	−30.83354	−30.83352	−30.83322
−30.83193	−30.83135	−30.83143	−30.82614	−30.82393	−30.81893	−30.82136	−30.83909
−29.33513	−29.33503	−29.33457	−29.33448	−29.33447	−29.33447	−29.33447	−29.33454
−29.33466	−29.33336	−29.33347	−29.33064	−29.32878	−29.32956	−29.33417	−29.36182
−28.20968	−28.20952	−28.20918	−28.20911	−28.20910	−28.20909	−28.20909	−28.20911
−28.20916	−28.20897	−28.20897	−28.20868	−28.20842	−28.21444	−28.22185	−28.25691
−26.88426	−26.88458	−26.88445	−26.88441	−26.88441	−26.88440	−26.88440	−26.88439
−26.88439	−26.88467	−26.88453	−26.88708	−26.88913	−26.90285	−26.91469	−26.95891
−26.43165	−26.43173	−26.43175	−26.43175	−26.43175	−26.43175	−26.43175	−26.43174
−26.43170	−26.43167	−26.43198	−26.43478	−26.43713	−26.45271	−26.46535	−26.51275
−26.20155	−26.20096	−26.20096	−26.20098	−26.20098	−26.20098	−26.20098	−26.20103
−26.20118	−26.20135	−26.20191	−26.20442	−26.20726	−26.22253	−26.23584	−26.28460
−26.06258	−26.06125	−26.06128	−26.06131	−26.06132	−26.06132	−26.06133	−26.06141
−26.06173	−26.06185	−26.06217	−26.06489	−26.06776	−26.08296	−26.09614	−26.14538
−25.96824	−25.96754	−25.96756	−25.96758	−25.96758	−25.96758	−25.96759	−25.96762
−25.96779	−25.96772	−25.96773	−25.97172	−25.97386	−25.98926	−26.00108	−26.05066
−25.90028	−25.90033	−25.90033	−25.90033	−25.90033	−25.90032	−25.90032	−25.90031
−25.90029	−25.90015	−25.89998	−25.90439	−25.90615	−25.92171	−25.93238	−25.98217
−25.81038	−25.81041	−25.81041	−25.81040	−25.81040	−25.81040	−25.81040	−25.81038
−25.81033	−25.81039	−25.81033	−25.81212	−25.81478	−25.83031	−25.84093	−25.89058
−25.77899	−25.77890	−25.77889	−25.77889	−25.77889	−25.77889	−25.77889	−25.77889
−25.77888	−25.77894	−25.77895	−25.77966	−25.78263	−25.79814	−25.80902	−25.85834
−25.59733	−25.59616	−25.59619	−25.59621	−25.59621	−25.59621	−25.59621	−25.59617
−25.59614	−25.59718	−25.59717	−25.59728	−25.59950	−25.61057	−25.62127	−25.66569
−25.56970	−25.56981	−25.56982	−25.56982	−25.56982	−25.56982	−25.56982	−25.56982
−25.56983	−25.56981	−25.56984	−25.57030	−25.57230	−25.58084	−25.59093	−25.63355
−25.56566	−25.56483	−25.56475	−25.56470	−25.56469	−25.56469	−25.56469	−25.56469
−25.56469	−25.56471	−25.56474	−25.56520	−25.56716	−25.57534	−25.58424	−25.62393
−25.55469	−25.55467	−25.55467	−25.55467	−25.55467	−25.55467	−25.55467	−25.55466
−25.55466	−25.55460	−25.55453	−25.55661	−25.55749	−25.56527	−25.57327	−25.61049
−26.26739	−26.26739	−26.26739	−26.26739	−26.26739	−26.26739	−26.26739	−26.26738
−26.26738	−26.26732	−26.26725	−26.26936	−26.27021	−26.27799	−26.28598	−26.32317
−26.60016	−26.60016	−26.60016	−26.60016	−26.60016	−26.60016	−26.60016	−26.60016
−26.60015	−26.60009	−26.60002	−26.60213	−26.60298	−26.61076	−26.61875	−26.65595
−26.81935	−26.81935	−26.81935	−26.81935	−26.81935	−26.81935	−26.81935	−26.81935
−26.81934	−26.81928	−26.81921	−26.82132	−26.82218	−26.82995	−26.83795	−26.87514
−27.05171	−27.05171	−27.05171	−27.05171	−27.05171	−27.05171	−27.05171	−27.05170
−27.05170	−27.05163	−27.05157	−27.05367	−27.05453	−27.06230	−27.07030	−27.10749
---------------------------------/		IGRD = 2	/ IPRT = 0	/-----------------/	Z1 = 2	/ DATE = 11/11/02	
−29.42396	−29.42396	−29.42396	−29.42396	−29.42395	−29.42387	−29.42379	−29.42737
−29.43101	−29.45950	−29.49228	−29.67524	−29.80728	−30.13312	−30.23947	−30.42092
−27.35193	−27.35193	−27.35193	−27.35192	−27.35191	−27.35177	−27.35162	−27.35585
−27.35677	−27.36779	−27.38228	−27.45692	−27.50332	−27.58844	−27.60939	−27.67376
−26.08395	−26.08395	−26.08395	−26.08394	−26.08394	−26.08393	−26.08391	−26.08419
−26.08392	−26.08253	−26.08124	−26.07563	−26.07344	−26.06687	−26.07076	−26.10846
−25.53616	−25.53616	−25.53616	−25.53616	−25.53616	−25.53615	−25.53613	−25.53604
−25.53516	−25.52825	−25.52221	−25.48750	−25.46768	−25.43425	−25.43087	−25.45173
−25.16170	−25.16170	−25.16170	−25.16170	−25.16169	−25.16162	−25.16127	−25.16035
−25.15941	−25.15056	−25.14082	−25.09056	−25.05970	−25.00796	−24.99695	−25.00743
−24.69276	−24.69276	−24.69276	−24.69276	−24.69276	−24.69280	−24.69284	−24.69135
−24.69025	−24.68015	−24.66912	−24.60420	−24.56150	−24.47801	−24.46096	−24.46244
−24.63807	−24.63807	−24.63807	−24.63807	−24.63807	−24.63807	−24.63806	−24.63803
−24.63703	−24.62582	−24.61459	−24.55224	−24.50884	−24.42910	−24.41769	−24.43994

(*continued on next page*)

Table 8 (*continued*)

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
−24.62887	−24.62887	−24.62887	−24.62887	−24.62887	−24.62887	−24.62886	−24.62880
−24.62785	−24.61730	−24.60754	−24.54698	−24.50695	−24.43622	−24.43329	−24.48093
−24.63530	−24.63521	−24.63520	−24.63519	−24.63519	−24.63518	−24.63517	−24.63502
−24.63396	−24.62498	−24.61468	−24.56076	−24.52444	−24.47045	−24.48003	−24.55842
−24.67421	−24.67422	−24.67422	−24.67422	−24.67422	−24.67420	−24.67417	−24.67393
−24.67268	−24.66585	−24.65728	−24.61508	−24.58953	−24.58239	−24.62266	−24.77861
−24.70459	−24.70461	−24.70461	−24.70461	−24.70461	−24.70461	−24.70466	−24.70439
−24.70308	−24.69783	−24.68996	−24.65181	−24.63065	−24.64769	−24.70466	−24.91114
−24.73195	−24.73191	−24.73190	−24.73190	−24.73189	−24.73180	−24.73154	−24.73108
−24.72937	−24.72522	−24.71773	−24.68031	−24.66100	−24.69054	−24.75820	−25.00232
−24.75244	−24.75235	−24.75235	−24.75234	−24.75233	−24.75227	−24.75211	−24.75170
−24.75003	−24.74563	−24.73866	−24.70170	−24.68431	−24.72027	−24.79546	−25.06925
−24.76131	−24.76127	−24.76127	−24.76128	−24.76130	−24.76152	−24.76248	−24.76255
−24.76186	−24.75788	−24.75174	−24.71759	−24.70158	−24.74212	−24.82197	−25.11900
−24.77093	−24.77093	−24.77093	−24.77096	−24.77099	−24.77141	−24.77310	−24.77355
−24.77370	−24.76968	−24.76401	−24.73237	−24.71682	−24.75978	−24.84288	−25.15765
−24.80515	−24.80511	−24.80510	−24.80511	−24.80513	−24.80533	−24.80610	−24.80642
−24.80667	−24.80021	−24.79410	−24.76295	−24.74634	−24.78860	−24.87638	−25.21482
−24.82186	−24.82178	−24.82178	−24.82178	−24.82178	−24.82183	−24.82200	−24.82220
−24.82239	−24.81466	−24.80833	−24.77649	−24.75930	−24.80041	−24.88952	−25.23641
−24.96497	−24.96501	−24.96501	−24.96501	−24.96501	−24.96499	−24.96497	−24.96486
−24.96392	−24.95794	−24.95109	−24.91604	−24.89495	−24.91150	−24.99227	−25.38553
−25.03510	−25.03511	−25.03511	−25.03511	−25.03511	−25.03512	−25.03514	−25.03448
−25.03376	−25.02859	−25.02276	−24.98772	−24.96472	−24.96272	−25.03289	−25.41875
−25.08295	−25.08287	−25.08287	−25.08286	−25.08286	−25.08288	−25.08290	−25.08219
−25.08164	−25.07690	−25.07144	−25.03681	−25.01155	−24.99740	−25.06095	−25.43532
−25.12444	−25.12444	−25.12444	−25.12444	−25.12444	−25.12446	−25.12448	−25.12362
−25.12292	−25.11900	−25.11362	−25.07999	−25.05380	−25.02791	−25.08016	−25.43669
−25.83778	−25.83778	−25.83778	−25.83778	−25.83778	−25.83780	−25.83782	−25.83695
−25.83625	−25.83234	−25.82696	−25.79335	−25.76715	−25.74112	−25.79322	−26.14952
−26.17055	−26.17055	−26.17055	−26.17055	−26.17055	−26.17057	−26.17059	−26.16972
−26.16903	−26.16511	−26.15973	−26.12612	−26.09992	−26.07390	−26.12599	−26.48229
−26.38974	−26.38974	−26.38974	−26.38974	−26.38974	−26.38976	−26.38978	−26.38891
−26.38822	−26.38430	−26.37893	−26.34531	−26.31911	−26.29309	−26.34518	−26.70148
−26.62209	−26.62209	−26.62209	−26.62210	−26.62210	−26.62211	−26.62213	−26.62127
−26.62057	−26.61666	−26.61128	−26.57766	−26.55147	−26.52544	−26.57753	−26.93383
--------------------------------/		IGRD = 1	/ IPRT = 0	/----------------/	Z1 = 3	/ DATE = 11/11/02	
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000	−74.00000
−73.43393	−65.98263	−66.63673	−67.84909	−67.71873	−67.77406	−67.76449	−67.76812
−67.76748	−67.76775	−67.76770	−67.76774	−67.76769	−67.76807	−67.76826	−67.76803
−38.65267	−38.05653	−38.10886	−38.20586	−38.19543	−38.19985	−38.19909	−38.19938
−38.19933	−38.19935	−38.19935	−38.19935	−38.19935	−38.19935	−38.19941	−38.19927
−33.04725	−33.09390	−33.08980	−33.08222	−33.08303	−33.08268	−33.08274	−33.08272
−33.08273	−33.08272	−33.08272	−33.08272	−33.08273	−33.08274	−33.08279	−33.08242
−30.86064	−30.84435	−30.84578	−30.84843	−30.84815	−30.84827	−30.84825	−30.84826
−30.84826	−30.84826	−30.84826	−30.84825	−30.84827	−30.84810	−30.84825	−30.84936
−29.18783	−29.19412	−29.19357	−29.19255	−29.19266	−29.19261	−29.19262	−29.19262
−29.19262	−29.19262	−29.19261	−29.19264	−29.19256	−29.19346	−29.19428	−29.19742
−27.28052	−27.28100	−27.28096	−27.28088	−27.28089	−27.28089	−27.28089	−27.28089
−27.28089	−27.28089	−27.28087	−27.28104	−27.28124	−27.28425	−27.28659	−27.29566
−26.65871	−26.65850	−26.65852	−26.65855	−26.65855	−26.65855	−26.65855	−26.65855
−26.65855	−26.65857	−26.65848	−26.65922	−26.65967	−26.66306	−26.66645	−26.67991
−26.35436	−26.35438	−26.35438	−26.35438	−26.35438	−26.35438	−26.35438	−26.35438
−26.35437	−26.35440	−26.35430	−26.35516	−26.35568	−26.35944	−26.36337	−26.37890
−26.17451	−26.17453	−26.17453	−26.17453	−26.17453	−26.17453	−26.17453	−26.17453
−26.17452	−26.17454	−26.17450	−26.17496	−26.17583	−26.18043	−26.18449	−26.20124

Table 8 (*continued*)

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
−26.05725	−26.05724	−26.05724	−26.05724	−26.05724	−26.05724	−26.05724	−26.05724
−26.05724	−26.05725	−26.05722	−26.05753	−26.05794	−26.06322	−26.06750	−26.08401
−25.97535	−25.97534	−25.97534	−25.97535	−25.97535	−25.97535	−25.97535	−25.97535
−25.97534	−25.97536	−25.97530	−25.97560	−25.97523	−25.98096	−25.98544	−26.00121
−25.86795	−25.86796	−25.86796	−25.86796	−25.86796	−25.86796	−25.86796	−25.86796
−25.86796	−25.86795	−25.86798	−25.86781	−25.86726	−25.87354	−25.87765	−25.89400
−25.83094	−25.83094	−25.83094	−25.83094	−25.83094	−25.83094	−25.83094	−25.83094
−25.83094	−25.83092	−25.83099	−25.83062	−25.83049	−25.83686	−25.84065	−25.85780
−25.63985	−25.63985	−25.63985	−25.63985	−25.63985	−25.63985	−25.63986	−25.63983
−25.63991	−25.63960	−25.64077	−25.64170	−25.64189	−25.64658	−25.64952	−25.66478
−25.61608	−25.61608	−25.61608	−25.61608	−25.61608	−25.61608	−25.61608	−25.61609
−25.61608	−25.61610	−25.61605	−25.61777	−25.61810	−25.62066	−25.62469	−25.64019
−25.61272	−25.61272	−25.61272	−25.61272	−25.61272	−25.61272	−25.61272	−25.61272
−25.61271	−25.61273	−25.61266	−25.61294	−25.61363	−25.61583	−25.61859	−25.63363
−25.61424	−25.61424	−25.61424	−25.61424	−25.61424	−25.61424	−25.61424	−25.61424
−25.61424	−25.61423	−25.61426	−25.61419	−25.61410	−25.61664	−25.61985	−25.63327
−25.81732	−25.81732	−25.81732	−25.81732	−25.81732	−25.81732	−25.81732	−25.81733
−25.81731	−25.81737	−25.81715	−25.81888	−25.81942	−25.82045	−25.82284	−25.83412
−26.15009	−26.15009	−26.15009	−26.15009	−26.15009	−26.15009	−26.15009	−26.15010
−26.15008	−26.15015	−26.14992	−26.15165	−26.15220	−26.15322	−26.15562	−26.16689
−26.36929	−26.36929	−26.36929	−26.36929	−26.36929	−26.36929	−26.36929	−26.36929
−26.36927	−26.36934	−26.36912	−26.37085	−26.37139	−26.37241	−26.37481	−26.38609
−26.60164	−26.60164	−26.60164	−26.60164	−26.60164	−26.60164	−26.60164	−26.60164
−26.60163	−26.60169	−26.60147	−26.60320	−26.60374	−26.60477	−26.60716	−26.61844

Table 9
Total recombination line power loss data for all ion stages of Li. See page 821 for Explanation of Tables

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
8.00000	8.69897	9.00000	9.69897	10.00000	10.69897	11.00000	11.69897
12.00000	12.69897	13.00000	13.69897	14.00000	14.69897	15.00000	15.69897
−0.69877	−0.52268	−0.30083	−0.15470	0.00020	0.47732	0.69917	0.84530
1.00020	1.30123	1.47732	1.60226	1.69917	1.77835	1.84530	1.95444
2.00020	2.47732	2.69917	2.84530	3.00020	3.47732	3.69917	3.84530
4.00020							
--------------------------------/		IPRT = 1	/ IGRD = 0	/----------------/	Z1 = 1	/ DATE = 11/11/02	
−30.13195	−30.08438	−30.05902	−29.97752	−29.93164	−29.80307	−29.73208	−29.53033
−29.42298	−29.12034	−28.96708	−28.57580	−28.39529	−28.10126	−27.95249	−27.25352
−30.28745	−30.25542	−30.23814	−30.18368	−30.15355	−30.06352	−30.01517	−29.87443
−29.79874	−29.58098	−29.46946	−29.17477	−29.02971	−28.79854	−28.66199	−27.96302
−30.46417	−30.44673	−30.43628	−30.40441	−30.38679	−30.33438	−30.30572	−30.22114
−30.17545	−30.04419	−29.97560	−29.79311	−29.69697	−29.58702	−29.48071	−28.78174
−30.56996	−30.55878	−30.55188	−30.53038	−30.51855	−30.48360	−30.46371	−30.40676
−30.37598	−30.28754	−30.24064	−30.11833	−30.05220	−30.01546	−29.92433	−29.22536
−30.67251	−30.66493	−30.66143	−30.64795	−30.64012	−30.61904	−30.60667	−30.57054
−30.55189	−30.49728	−30.46883	−30.39686	−30.35708	−30.37351	−30.29161	−29.59264
−30.90475	−30.90183	−30.90239	−30.90202	−30.90044	−30.89638	−30.89488	−30.89086
−30.88859	−30.88650	−30.88379	−30.88546	−30.87796	−30.95014	−30.87740	−30.17843
−30.95098	−30.95126	−30.95121	−30.95094	−30.95132	−30.95290	−30.95130	−30.95178
−30.95177	−30.95252	−30.95368	−30.96231	−30.95821	−31.03089	−30.95780	−30.25883
−30.92577	−30.92544	−30.92555	−30.92528	−30.92551	−30.92873	−30.92870	−30.92854
−30.92843	−30.93158	−30.93268	−30.93962	−30.93605	−31.01075	−30.93760	−30.23863
−30.76465	−30.76549	−30.76545	−30.76551	−30.76546	−30.76475	−30.76471	−30.76463
−30.76538	−30.76777	−30.76705	−30.77588	−30.77047	−30.84621	−30.77277	−30.07380
−30.29876	−30.29868	−30.29871	−30.29863	−30.29866	−30.29880	−30.29886	−30.29977
−30.29939	−30.30038	−30.30058	−30.30615	−30.30138	−30.37502	−30.30237	−29.60340
−30.16980	−30.17050	−30.17044	−30.17063	−30.17066	−30.17144	−30.17132	−30.17117
−30.17136	−30.17182	−30.17189	−30.17831	−30.17326	−30.24637	−30.17315	−29.47418
−30.14532	−30.14529	−30.14535	−30.14603	−30.14597	−30.14615	−30.14610	−30.14623
−30.14659	−30.14709	−30.14717	−30.15317	−30.14791	−30.22155	−30.14836	−29.44939
−30.15281	−30.15308	−30.15308	−30.15351	−30.15345	−30.15328	−30.15331	−30.15392
−30.15405	−30.15467	−30.15469	−30.16028	−30.15524	−30.22916	−30.15600	−29.45703
−30.17131	−30.17203	−30.17196	−30.17197	−30.17196	−30.17189	−30.17195	−30.17272
−30.17261	−30.17327	−30.17326	−30.17868	−30.17390	−30.24771	−30.17456	−29.47559
−30.19337	−30.19391	−30.19386	−30.19373	−30.19377	−30.19413	−30.19413	−30.19467
−30.19451	−30.19511	−30.19516	−30.20061	−30.19587	−30.26938	−30.19624	−29.49727
−30.23390	−30.23380	−30.23384	−30.23379	−30.23386	−30.23467	−30.23458	−30.23456
−30.23454	−30.23532	−30.23531	−30.24082	−30.23605	−30.30910	−30.23601	−29.53704
−30.25057	−30.25041	−30.25046	−30.25045	−30.25051	−30.25115	−30.25107	−30.25097
−30.25099	−30.25206	−30.25189	−30.25735	−30.25264	−30.32564	−30.25256	−29.55359
−30.44766	−30.44756	−30.44766	−30.44875	−30.44863	−30.44864	−30.44863	−30.44866
−30.44863	−30.44901	−30.44863	−30.45387	−30.44863	−30.52174	−30.44863	−29.74966
−30.78043	−30.78033	−30.78043	−30.78152	−30.78140	−30.78141	−30.78140	−30.78143
−30.78140	−30.78178	−30.78140	−30.78664	−30.78140	−30.85451	−30.78140	−30.08243
−30.99962	−30.99952	−30.99962	−31.00071	−31.00060	−31.00061	−31.00060	−31.00062
−31.00060	−31.00097	−31.00060	−31.00583	−31.00060	−31.07371	−31.00060	−30.30163
−31.23197	−31.23188	−31.23197	−31.23307	−31.23295	−31.23296	−31.23295	−31.23298
−31.23295	−31.23332	−31.23295	−31.23819	−31.23295	−31.30606	−31.23295	−30.53398
−31.94766	−31.94756	−31.94766	−31.94875	−31.94863	−31.94864	−31.94863	−31.94866
−31.94863	−31.94901	−31.94863	−31.95387	−31.94863	−32.02174	−31.94863	−31.24966
−32.28043	−32.28033	−32.28043	−32.28152	−32.28140	−32.28141	−32.28140	−32.28143
−32.28140	−32.28178	−32.28140	−32.28664	−32.28140	−32.35451	−32.28140	−31.58243
−32.49962	−32.49952	−32.49962	−32.50071	−32.50060	−32.50061	−32.50060	−32.50062
−32.50060	−32.50097	−32.50060	−32.50583	−32.50060	−32.57371	−32.50060	−31.80163
−32.73197	−32.73188	−32.73197	−32.73307	−32.73295	−32.73296	−32.73295	−32.73298
−32.73295	−32.73332	−32.73295	−32.73819	−32.73295	−32.80606	−32.73295	−32.03398
--------------------------------/		IPRT = 2	/ IGRD = 0	/----------------/	Z1 =;1	/ DATE = 11/11/02	
−31.11082	−31.09823	−31.09220	−31.07436	−31.06264	−31.02702	−31.00761	−30.95217
−30.92138	−30.82689	−30.77513	−30.62948	−30.54617	−30.35095	−30.18377	−29.48480

Table 9 (*continued*)

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
−31.19724	−31.18916	−31.18536	−31.17271	−31.16501	−31.14036	−31.12698	−31.08859
−31.06800	−31.00322	−30.96524	−30.86581	−30.80540	−30.68418	−30.54188	−29.84291
−31.29551	−31.29044	−31.28827	−31.28114	−31.27624	−31.26211	−31.25397	−31.23120
−31.21790	−31.17809	−31.15555	−31.09502	−31.05597	−31.00341	−30.88539	−30.18642
−31.35232	−31.34885	−31.34754	−31.34245	−31.33921	−31.32942	−31.32375	−31.30777
−31.29824	−31.27031	−31.25370	−31.21186	−31.18157	−31.16532	−31.05975	−30.36078
−31.40477	−31.40223	−31.40118	−31.39849	−31.39635	−31.38934	−31.38583	−31.37488
−31.36859	−31.34962	−31.33834	−31.31101	−31.28857	−31.30049	−31.20542	−30.50645
−31.49984	−31.49999	−31.49947	−31.49873	−31.49904	−31.49646	−31.49553	−31.49319
−31.49104	−31.48696	−31.48391	−31.48066	−31.47135	−31.52783	−31.44858	−30.74961
−31.50380	−31.50340	−31.50294	−31.50281	−31.50222	−31.50161	−31.50162	−31.49990
−31.49958	−31.49787	−31.49618	−31.49638	−31.48935	−31.55502	−31.47893	−30.77996
−31.49002	−31.49009	−31.49021	−31.48978	−31.48923	−31.48954	−31.48934	−31.48803
−31.48816	−31.48715	−31.48598	−31.48828	−31.48185	−31.55028	−31.47529	−30.77632
−31.46443	−31.46441	−31.46438	−31.46449	−31.46460	−31.46468	−31.46456	−31.46296
−31.46312	−31.46364	−31.46258	−31.46637	−31.46076	−31.53049	−31.45668	−30.75771
−31.38751	−31.38750	−31.38750	−31.38751	−31.38752	−31.38750	−31.38752	−31.38786
−31.38772	−31.38702	−31.38675	−31.39137	−31.38563	−31.45839	−31.38472	−30.68575
−31.32922	−31.32923	−31.32923	−31.32922	−31.32922	−31.32923	−31.32922	−31.32916
−31.32915	−31.32988	−31.32939	−31.33364	−31.32869	−31.40132	−31.32771	−30.62874
−31.28318	−31.28318	−31.28318	−31.28318	−31.28318	−31.28318	−31.28318	−31.28318
−31.28316	−31.28361	−31.28322	−31.28827	−31.28313	−31.35587	−31.28228	−30.58331
−31.24572	−31.24572	−31.24572	−31.24572	−31.24572	−31.24573	−31.24572	−31.24577
−31.24573	−31.24606	−31.24570	−31.25105	−31.24575	−31.31827	−31.24501	−30.54604
−31.21485	−31.21485	−31.21485	−31.21485	−31.21485	−31.21485	−31.21485	−31.21487
−31.21485	−31.21522	−31.21484	−31.22016	−31.21485	−31.28718	−31.21414	−30.51517
−31.18888	−31.18888	−31.18888	−31.18888	−31.18888	−31.18888	−31.18888	−31.18890
−31.18887	−31.18927	−31.18888	−31.19414	−31.18887	−31.26132	−31.18815	−30.48918
−31.14345	−31.14345	−31.14345	−31.14345	−31.14345	−31.14345	−31.14345	−31.14347
−31.14345	−31.14382	−31.14344	−31.14866	−31.14345	−31.21632	−31.14289	−30.44392
−31.12289	−31.12289	−31.12289	−31.12289	−31.12289	−31.12290	−31.12289	−31.12292
−31.12289	−31.12326	−31.12289	−31.12811	−31.12290	−31.19588	−31.12251	−30.42354
−31.05167	−31.05167	−31.05167	−31.05167	−31.05167	−31.05167	−31.05167	−31.05169
−31.05167	−31.05204	−31.05167	−31.05691	−31.05167	−31.12478	−31.05167	−30.35270
−31.38444	−31.38444	−31.38444	−31.38444	−31.38444	−31.38444	−31.38444	−31.38447
−31.38444	−31.38482	−31.38444	−31.38968	−31.38444	−31.45755	−31.38444	−30.68547
−31.60363	−31.60363	−31.60363	−31.60363	−31.60363	−31.60363	−31.60363	−31.60366
−31.60363	−31.60401	−31.60363	−31.60887	−31.60363	−31.67674	−31.60363	−30.90466
−31.83599	−31.83599	−31.83599	−31.83599	−31.83599	−31.83599	−31.83599	−31.83601
−31.83599	−31.83636	−31.83599	−31.84122	−31.83599	−31.90910	−31.83599	−31.13702
−32.55167	−32.55167	−32.55167	−32.55167	−32.55167	−32.55167	−32.55167	−32.55169
−32.55167	−32.55204	−32.55167	−32.55691	−32.55167	−32.62478	−32.55167	−31.85270
−32.88444	−32.88444	−32.88444	−32.88444	−32.88444	−32.88444	−32.88444	−32.88447
−32.88444	−32.88482	−32.88444	−32.88968	−32.88444	−32.95755	−32.88444	−32.18547
−33.10363	−33.10363	−33.10363	−33.10363	−33.10363	−33.10363	−33.10363	−33.10366
−33.10363	−33.10401	−33.10363	−33.10887	−33.10363	−33.17674	−33.10363	−32.40466
−33.33599	−33.33599	−33.33599	−33.33599	−33.33599	−33.33599	−33.33599	−33.33601
−33.33599	−33.33636	−33.33599	−33.34122	−33.33599	−33.40910	−33.33599	−32.63702
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−28.33790	−28.27612	−28.24075	−28.12242	−28.05732	−27.87113	−27.77536	−27.50173
−27.35196	−26.92832	−26.71772	−26.16459	−25.90438	−25.26551	−24.98282	−24.32936
−28.50242	−28.45933	−28.43416	−28.34859	−28.30179	−28.16657	−28.09665	−27.89090
−27.77701	−27.44905	−27.28328	−26.82829	−26.60326	−26.02497	−25.75721	−25.12042
−28.69055	−28.66403	−28.64731	−28.59305	−28.56276	−28.47452	−28.42691	−28.28592
−28.20694	−27.98215	−27.86462	−27.53243	−27.36201	−26.89945	−26.67294	−26.09869
−28.80926	−28.78903	−28.77561	−28.73637	−28.71458	−28.64675	−28.61199	−28.50406
−28.44395	−28.26964	−28.17845	−27.91843	−27.78105	−27.39973	−27.20910	−26.70610
−28.92638	−28.91435	−28.90564	−28.87482	−28.85931	−28.81217	−28.78546	−28.70493
−28.65987	−28.53092	−28.46170	−28.26160	−28.15582	−27.85832	−27.70472	−27.29134
−29.27229	−29.26756	−29.26498	−29.25610	−29.25045	−29.23415	−29.22496	−29.19614
−29.17984	−29.13139	−29.10561	−29.02688	−28.98512	−28.86545	−28.80095	−28.61529
−29.42283	−29.42083	−29.41951	−29.41403	−29.41055	−29.40166	−29.39623	−29.37960

(*continued on next page*)

Table 9 (*continued*)

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
−29.37009	−29.34193	−29.32576	−29.27898	−29.25371	−29.18093	−29.14115	−29.02395
−29.51453	−29.51403	−29.51223	−29.50973	−29.50727	−29.50130	−29.49828	−29.48679
−29.48008	−29.46143	−29.45028	−29.41820	−29.40085	−29.34962	−29.32212	−29.23985
−29.55997	−29.55985	−29.55961	−29.55915	−29.55881	−29.55766	−29.55547	−29.55171
−29.54853	−29.53859	−29.53291	−29.51459	−29.50498	−29.47512	−29.45799	−29.40744
−28.94889	−28.95852	−28.96271	−28.97407	−28.97989	−28.99453	−29.00166	−29.01724
−29.02347	−29.03891	−29.04522	−29.05781	−29.06270	−29.07107	−29.07430	−29.07956
−28.60265	−28.61357	−28.61788	−28.63068	−28.63765	−28.65587	−28.66403	−28.68174
−28.68950	−28.70814	−28.71582	−28.73218	−28.73884	−28.75086	−28.75564	−28.76615
−28.47341	−28.48430	−28.48867	−28.50258	−28.50996	−28.52888	−28.53629	−28.55474
−28.56336	−28.58295	−28.59059	−28.60837	−28.61566	−28.62817	−28.63365	−28.64620
−28.42469	−28.43627	−28.44090	−28.45491	−28.46206	−28.48045	−28.48785	−28.50737
−28.51618	−28.53695	−28.54460	−28.56262	−28.57004	−28.58257	−28.58858	−28.60089
−28.41309	−28.42474	−28.42941	−28.44347	−28.45047	−28.46886	−28.47668	−28.49656
−28.50540	−28.52623	−28.53386	−28.55180	−28.55914	−28.57280	−28.57885	−28.59105
−28.41979	−28.43135	−28.43598	−28.44990	−28.45701	−28.47545	−28.48377	−28.50349
−28.51229	−28.53311	−28.54073	−28.55861	−28.56593	−28.58057	−28.58652	−28.59871
−28.45690	−28.46860	−28.47331	−28.48639	−28.49402	−28.51201	−28.52094	−28.53993
−28.54856	−28.57030	−28.57804	−28.59610	−28.60368	−28.61832	−28.62425	−28.63608
−28.48069	−28.49241	−28.49715	−28.50994	−28.51763	−28.53550	−28.54449	−28.56333
−28.57182	−28.59369	−28.60157	−28.61990	−28.62749	−28.64195	−28.64787	−28.65940
−28.88986	−28.89815	−28.90301	−28.91352	−28.91893	−28.93655	−28.94324	−28.96073
−28.96917	−28.98818	−28.99568	−29.01149	−29.01800	−29.03217	−29.03675	−29.04919
−29.09896	−29.10636	−29.11006	−29.11977	−29.12454	−29.13813	−29.14427	−29.15857
−29.16549	−29.18045	−29.18686	−29.20045	−29.20589	−29.21774	−29.22179	−29.23184
−29.21387	−29.22007	−29.22339	−29.23088	−29.23463	−29.24544	−29.25067	−29.26295
−29.26782	−29.28055	−29.28572	−29.29673	−29.30115	−29.31005	−29.31322	−29.32190
−29.28939	−29.29446	−29.29651	−29.30181	−29.30442	−29.31249	−29.31629	−29.32467
−29.32798	−29.33664	−29.34070	−29.34825	−29.35123	−29.35747	−29.36004	−29.36688
−30.00302	−30.00808	−30.01011	−30.01539	−30.01799	−30.02602	−30.02980	−30.03812
−30.04142	−30.05003	−30.05408	−30.06158	−30.06453	−30.07075	−30.07332	−30.08013
−30.33579	−30.34085	−30.34289	−30.34816	−30.35076	−30.35879	−30.36258	−30.37090
−30.37419	−30.38280	−30.38685	−30.39435	−30.39731	−30.40352	−30.40609	−30.41290
−30.55499	−30.56004	−30.56208	−30.56735	−30.56995	−30.57798	−30.58177	−30.59009
−30.59339	−30.60199	−30.60604	−30.61355	−30.61650	−30.62271	−30.62528	−30.63209
−30.78734	−30.79240	−30.79443	−30.79971	−30.80231	−30.81034	−30.81412	−30.82244
−30.82574	−30.83434	−30.83840	−30.84590	−30.84885	−30.85507	−30.85763	−30.86445
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−27.42931	−27.35508	−27.31632	−27.21714	−27.16372	−26.97963	−26.87315	−26.56939
−26.41657	−25.99367	−25.76444	−25.11663	−24.81073	−24.08230	−23.75908	−23.02841
−27.56713	−27.51046	−27.48040	−27.40271	−27.36026	−27.21462	−27.13083	−26.89006
−26.76736	−26.42130	−26.23241	−25.69630	−25.43687	−24.79357	−24.50020	−23.81100
−27.74057	−27.70559	−27.68635	−27.63528	−27.60644	−27.50879	−27.45309	−27.29042
−27.20528	−26.95542	−26.81705	−26.42056	−26.21958	−25.68531	−25.43021	−24.79529
−27.85270	−27.82797	−27.81441	−27.77663	−27.75505	−27.68432	−27.64263	−27.52009
−27.45594	−27.26301	−27.15484	−26.83994	−26.67646	−26.22884	−26.00516	−25.42581
−27.96666	−27.94857	−27.93866	−27.91236	−27.89753	−27.84595	−27.81628	−27.72866
−27.68149	−27.53667	−27.45474	−27.21513	−27.08862	−26.73083	−26.54638	−26.05208
−28.30066	−28.29526	−28.29223	−28.28379	−28.27888	−28.26154	−28.25150	−28.22074
−28.20392	−28.15108	−28.12100	−28.02957	−27.97940	−27.83186	−27.75120	−27.52254
−28.45083	−28.44808	−28.44644	−28.44095	−28.43814	−28.42824	−28.42266	−28.40495
−28.39470	−28.36299	−28.34482	−28.28936	−28.25869	−28.16716	−28.11720	−27.97301
−28.54812	−28.54605	−28.54486	−28.54203	−28.54042	−28.53381	−28.52948	−28.51738
−28.51080	−28.48832	−28.47553	−28.43572	−28.41379	−28.34877	−28.31321	−28.20904
−28.64970	−28.64918	−28.64851	−28.64577	−28.64445	−28.64104	−28.63855	−28.62941
−28.62481	−28.60946	−28.60098	−28.57534	−28.56027	−28.51569	−28.49114	−28.41930
−28.83859	−28.83799	−28.83760	−28.83761	−28.83767	−28.83398	−28.83281	−28.83066
−28.82808	−28.82282	−28.81904	−28.80766	−28.80096	−28.78069	−28.77026	−28.73861
−28.93706	−28.93735	−28.93751	−28.93744	−28.93778	−28.93665	−28.93635	−28.93567
−28.93348	−28.93016	−28.92832	−28.92112	−28.91724	−28.90659	−28.90100	−28.88154
−29.00257	−29.00256	−29.00255	−29.00251	−29.00247	−29.00253	−29.00241	−29.00287
−29.00115	−28.99853	−28.99755	−28.99131	−28.98899	−28.98368	−28.98054	−28.96606
−29.04985	−29.04997	−29.04999	−29.04950	−29.04937	−29.04913	−29.04884	−29.04845

Table 9 (*continued*)

3 16	25 1	3	/LITHIUM		/GCR PROJECT		
1 2	1 1						
−29.04786	−29.04646	−29.04564	−29.04226	−29.04052	−29.03619	−29.03367	−29.02454
−29.08437	−29.08452	−29.08457	−29.08406	−29.08399	−29.08371	−29.08334	−29.08252
−29.08245	−29.08154	−29.08090	−29.07914	−29.07783	−29.07419	−29.07221	−29.06645
−29.11029	−29.11036	−29.11038	−29.11018	−29.11017	−29.11015	−29.10982	−29.10920
−29.10912	−29.10819	−29.10780	−29.10642	−29.10552	−29.10286	−29.10152	−29.09741
−29.14724	−29.14719	−29.14717	−29.14732	−29.14720	−29.14708	−29.14700	−29.14692
−29.14678	−29.14619	−29.14594	−29.14490	−29.14450	−29.14291	−29.14232	−29.14007
−29.16077	−29.16071	−29.16069	−29.16085	−29.16063	−29.16030	−29.16033	−29.16036
−29.16026	−29.15999	−29.15971	−29.15892	−29.15864	−29.15727	−29.15682	−29.15520
−29.21811	−29.21811	−29.21811	−29.21811	−29.21810	−29.21805	−29.21811	−29.21821
−29.21820	−29.21822	−29.21820	−29.21821	−29.21822	−29.21816	−29.21813	−29.21876
−29.19613	−29.19613	−29.19613	−29.19613	−29.19613	−29.19614	−29.19613	−29.19613
−29.19613	−29.19612	−29.19613	−29.19607	−29.19604	−29.19609	−29.19603	−29.19656
−29.16943	−29.16943	−29.16943	−29.16943	−29.16943	−29.16943	−29.16943	−29.16944
−29.16943	−29.16947	−29.16942	−29.16986	−29.17004	−29.16991	−29.16990	−29.16997
−29.12788	−29.12788	−29.12788	−29.12788	−29.12788	−29.12788	−29.12788	−29.12788
−29.12789	−29.12780	−29.12773	−29.12800	−29.12804	−29.12840	−29.12860	−29.12836
−29.18381	−29.18381	−29.18381	−29.18381	−29.18381	−29.18381	−29.18381	−29.18381
−29.18381	−29.18381	−29.18381	−29.18381	−29.18381	−29.18380	−29.18383	−29.18371
−29.51658	−29.51658	−29.51658	−29.51658	−29.51658	−29.51658	−29.51658	−29.51658
−29.51658	−29.51658	−29.51658	−29.51658	−29.51658	−29.51657	−29.51660	−29.51649
−29.73577	−29.73577	−29.73577	−29.73577	−29.73577	−29.73577	−29.73577	−29.73577
−29.73577	−29.73577	−29.73577	−29.73577	−29.73577	−29.73577	−29.73580	−29.73568
−29.96813	−29.96813	−29.96813	−29.96813	−29.96813	−29.96813	−29.96813	−29.96813
−29.96813	−29.96813	−29.96813	−29.96813	−29.96813	−29.96812	−29.96815	−29.96803