

# **IRSN NUCLEA-20 Nuclear Alloys-Oxides Database (NUCL20)**

## **Overview Including Phase and System Information**

*Available Starting with Thermo-Calc Version 2022b*



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# Overview of NUCLEA-20

January 10, 2022

## 1 General Description

### 1.1 Atoms

|                |                               |
|----------------|-------------------------------|
| 18 + 2 atoms   |                               |
| U, O, Zr       | fuel element                  |
| Ag, In, B, C   | control rod                   |
| Fe, Cr, Ni     | vessel and internal structure |
| Si, Mg, Al, Ca | concrete                      |
| Ba, La, Ru, Sr | fission products              |
| Ar, H          | gas                           |

### 1.2 Stoichiometric Condensed Phases

| NTB name               | TDB name          |
|------------------------|-------------------|
| <b>AG1BA1 (S)</b>      | <b>AG1BA1_S</b>   |
| <b>AG2BA1 (S)</b>      | <b>AG2BA1_S</b>   |
| <b>AG2BA3 (S)</b>      | <b>AG2BA3_S</b>   |
| <b>AG5BA1 (S)</b>      | <b>AG5BA1_S</b>   |
| <b>AG2C1O3 (S)</b>     | <b>AG2C1O3_S</b>  |
| <b>AG1CA1 (S)</b>      | <b>AG1CA1_S</b>   |
| <b>AG1CA3 (S)</b>      | <b>AG1CA3_S</b>   |
| <b>AG2CA1 (S)</b>      | <b>AG2CA1_S</b>   |
| <b>AG3CA5 (S)</b>      | <b>AG3CA5_S</b>   |
| <b>AG7CA2 (S)</b>      | <b>AG7CA2_S</b>   |
| <b>AG9CA2 (S)</b>      | <b>AG9CA2_S</b>   |
| <b>AG2CR1O4 (S)</b>    | <b>AG2CR1O4_S</b> |
| <b>AG1IN2 (S)</b>      | <b>AG1IN2_S</b>   |
| <b>AG2IN1 (S)</b>      | <b>AG2IN1_S</b>   |
| <b>AG3IN1 (S)</b>      | <b>AG3IN1_S</b>   |
| <b>AG1LA1 (S)</b>      | <b>AG1LA1_S</b>   |
| <b>AG2LA1 (S)</b>      | <b>AG2LA1_S</b>   |
| <b>AG5LA1 (S)</b>      | <b>AG5LA1_S</b>   |
| <b>AG46LA14 (S)</b>    | <b>AG46LA14_S</b> |
| <b>AG1MG3 (S)</b>      | <b>AG1MG3_S</b>   |
| <b>AG3MG1 (S)</b>      | <b>AG3MG1_S</b>   |
| <b>AG2O1 (S)</b>       | <b>AG2O1_S</b>    |
| <b>AG1SR1 (S)</b>      | <b>AG1SR1_S</b>   |
| <b>AG2SR1 (S)</b>      | <b>AG2SR1_S</b>   |
| <b>AG2SR3 (S)</b>      | <b>AG2SR3_S</b>   |
| <b>AG4SR1 (S)</b>      | <b>AG4SR1_S</b>   |
| <b>AG5SR1 (S)</b>      | <b>AG5SR1_S</b>   |
| <b>AG1ZR1 (S)</b>      | <b>AG1ZR1_S</b>   |
| <b>AG1ZR2 (S)</b>      | <b>AG1ZR2_S</b>   |
| <b>AL1B2 (S)</b>       | <b>AL1B2_S</b>    |
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|----------------------------------|------------------|
| NTB name                         | TDB name         |
| AL1B10 (S)                       | AL1B10_S         |
| AL1B12 (S)                       | AL1B12_S         |
| AL4B2O9 (S)                      | AL4B2O9_S        |
| AL4BA1 (S)                       | AL4BA1_S         |
| AL5BA4 (S)                       | AL5BA4_S         |
| AL13BA7 (S)                      | AL13BA7_S        |
| AL2BA1O4 (S)                     | AL2BA1O4_S       |
| AL2BA3O6 (S)                     | AL2BA3O6_S       |
| AL2BA4O7 (S)                     | AL2BA4O7_S       |
| AL2BA7O10 (S)                    | AL2BA7O10_S      |
| AL12BA1O19 (S)                   | AL12BA1O19_S     |
| AL4C3 (S)                        | AL4C3_S          |
| AL4C4SI1 (S)                     | AL4C4SI1_S       |
| AL8C7SI1 (S)                     | AL8C7SI1_S       |
| AL1CA1 (S)                       | AL1CA1_S         |
| AL2CA1 (S)                       | AL2CA1_S03       |
| AL3CA8 (S)                       | AL3CA8_S         |
| AL4CA1 (S)                       | AL4CA1_S         |
| AL2CA3H12O12 (S)                 | AL2CA3H12O12_S   |
| AL2CA4H26O20 (S)                 | AL2CA4H26O20_S   |
| AL2CA1H4O10SI2 (S)               | AL2CA1H4O10SI2_S |
| AL4CA3MG1O10 (S)                 | AL4CA3MG1O10_S   |
| AL16CA1MG2O27 (S)                | AL16CA1MG2O27_S  |
| AL28CA2MG2O46 (S)                | AL28CA2MG2O46_S  |
| AL14CA12O33 (S) Mayenite         | AL14CA12O33_S    |
| AL2CA1O8SI2 (S) Anorthite        | AL2CA1O8SI2_S    |
| AL2CA2O7SI1 (S) Melilite         | AL2CA2O7SI1_S    |
| AL12CA13O35ZR2 (S)               | AL12CA13O35ZR2_S |
| AL2CA1SI2 (S)                    | AL2CA1SI2_S      |
| AL1CR2 (S)                       | AL1CR2_S         |
| AL4CR1 (S)                       | AL4CR1_S         |
| AL8CR5 (S)                       | AL8CR5_S         |
| AL9CR4 (S)                       | AL9CR4_S         |
| AL13CR2 (S)                      | AL13CR2_S        |
| AL2FE1 (S)                       | AL2FE1_S         |
| AL5FE2 (S)                       | AL5FE2_S         |
| AL1FE1O3 (S)                     | AL1FE1O3_S       |
| AL2FE3O12SI3 (S) Almandine       | AL2FE3O12SI3_S   |
| AL4FE2O18SI5 (S) Ferrocordierite | AL4FE2O18SI5_S   |
| AL1H3 (S)                        | AL1H3_S01        |
| AL1H1O2 (S) Boehmite             | AL1H1O2_S1       |
| AL1H1O2 (S) Diaspore             | AL1H1O2_S2       |
| AL1H3O3 (S) Amorphous            | AL1H3O3_S1       |
| AL1H3O3 (S) Hydrargillite        | AL1H3O3_S2       |
| AL2H4O9SI2 (S) Dickite           | AL2H4O9SI2_S1    |
| AL2H4O9SI2 (S) Halloysite        | AL2H4O9SI2_S2    |
| AL2H4O9SI2 (S) Kaolinite         | AL2H4O9SI2_S3    |

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|------------------------------|-----------------|
| NTB name                     | TDB name        |
| AL1LA1 (S)                   | AL1LA1_S02      |
| AL1LA3 (S)                   | AL1LA3_S        |
| AL2LA1 (S)                   | AL2LA1_S        |
| AL3LA1 (S)                   | AL3LA1_S        |
| AL11LA3 (S)                  | AL11LA3_S       |
| AL12LA5 (S)                  | AL12LA5_S       |
| AL1LA1O3 (S)                 | AL1LA1O3_S      |
| AL11LA1O18 (S)               | AL11LA1O18_S    |
| AL30MG23 (S)                 | AL30MG23_S      |
| AL140MG89 (S)                | AL140MG89_S     |
| AL4MG2O18SI5 (S) Cordierite  | AL4MG2O18SI5_S  |
| AL18MG7O40SI3 (S) Saphirine  | AL18MG7O40SI3_S |
| AL1NI3 (S)                   | AL1NI3_S        |
| AL3NI1 (S)                   | AL3NI1_S        |
| AL3NI2 (S)                   | AL3NI2_S        |
| AL2O4SR1 (S) HT              | AL2O4SR1_S1     |
| AL2O4SR1 (S) LT              | AL2O4SR1_S2     |
| AL2O6SR3 (S)                 | AL2O6SR3_S      |
| AL4O7SR1 (S)                 | AL4O7SR1_S      |
| AL6O23SR14 (S) LT            | AL6O23SR14_S1   |
| AL6O23SR14 (S) HT            | AL6O23SR14_S2   |
| AL12O19SR1 (S)               | AL12O19SR1_S    |
| AL1RU1 (S)                   | AL1RU1_S        |
| AL2RU1 (S)                   | AL2RU1_S        |
| AL3RU2 (S)                   | AL3RU2_S        |
| AL6RU1 (S)                   | AL6RU1_S        |
| AL13RU4 (S)                  | AL13RU4_S       |
| AL1SR1 (S)                   | AL1SR1_S        |
| AL2SR1 (S)                   | AL2SR1_S        |
| AL4SR1 (S)                   | AL4SR1_S        |
| AL2U1 (S)                    | AL2U1_S         |
| AL3U1 (S)                    | AL3U1_S         |
| AL4U0.9 (S)                  | AL4U0_9_S       |
| AL1ZR1 (S)                   | AL1ZR1_S        |
| AL1ZR2 (S)                   | AL1ZR2_S        |
| AL1ZR3 (S)                   | AL1ZR3_S        |
| AL2ZR1 (S)                   | AL2ZR1_S        |
| AL2ZR3 (S)                   | AL2ZR3_S        |
| AL3ZR1 (S)                   | AL3ZR1_S        |
| AL3ZR2 (S)                   | AL3ZR2_S        |
| AL3ZR4 (S)                   | AL3ZR4_S        |
| AL3ZR5 (S)                   | AL3ZR5_S        |
| AL4ZR5 (S)                   | AL4ZR5_S        |
| B6BA1 (S)                    | B6BA1_S         |
| B2BA1O4 (S)                  | B2BA1O4_S       |
| B2BA3O6 (S)                  | B2BA3O6_S       |
| B4BA1O7 (S)                  | B4BA1O7_S       |

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| NTB name                     | TDB name      |
| B8BA1O13 (S)                 | B8BA1O13_S    |
| B1C1U1 (S)                   | B1C1U1_S      |
| B2C1U1 (S)                   | B2C1U1_S      |
| B2C7U5 (S)                   | B2C7U5_S      |
| B6CA1 (S)                    | B6CA1_S       |
| B2CA1O4 (S)                  | B2CA1O4_S     |
| B2CA2O5 (S)                  | B2CA2O5_S     |
| B2CA3O6 (S)                  | B2CA3O6_S     |
| B4CA1O7 (S)                  | B4CA1O7_S     |
| B2CA1O8SI2 (S)               | B2CA1O8SI2_S  |
| B2CA5O10SI1 (S)              | B2CA5O10SI1_S |
| B1CR1 (S)                    | B1CR1_S       |
| B1CR2 (S)                    | B1CR2_S       |
| B2CR1 (S)                    | B2CR1_S       |
| B3CR5 (S)                    | B3CR5_S       |
| B4CR1 (S)                    | B4CR1_S       |
| B4CR3 (S)                    | B4CR3_S       |
| B1FE1 (S)                    | B1FE1_S05     |
| B1FE2 (S)                    | B1FE2_S       |
| B1FE1O3 (S)                  | B1FE1O3_S     |
| B1FE3O6 (S)                  | B1FE3O6_S     |
| B2FE1O4 (S)                  | B2FE1O4_S     |
| B2FE2O5 (S)                  | B2FE2O5_S     |
| B2FE3O6 (S)                  | B2FE3O6_S     |
| B2FE3U1 (S)                  | B2FE3U1_S     |
| B4FE1U1 (S)                  | B4FE1U1_S     |
| B5H9 (L)                     | B5H9_L        |
| B10H14 (C) Decaborane        | B10H14_S      |
| B1H1O2 (C)                   | B1H1O2_S      |
| B1H3O3 (S)                   | B1H3O3_S      |
| B2H4O4 (S)                   | B2H4O4_S      |
| B3H3O3 (S) Boroxine          | B3H3O3_S      |
| B1IN1O3 (S)                  | B1IN1O3_S     |
| B4LA1 (S)                    | B4LA1_S       |
| B6LA1 (S)                    | B6LA1_S       |
| B9LA1 (S)                    | B9LA1_S       |
| B1LA1O3 (S)                  | B1LA1O3_S     |
| B1LA3O6 (S)                  | B1LA3O6_S     |
| B3LA1O6 (S)                  | B3LA1O6_S     |
| B2MG1 (S)                    | B2MG1_S       |
| B4MG1 (S)                    | B4MG1_S07     |
| B7MG1 (S)                    | B7MG1_S       |
| B2MG2O5 (S)                  | B2MG2O5_S     |
| B2MG3O6 (S)                  | B2MG3O6_S     |
| B4MG1O7 (S)                  | B4MG1O7_S     |
| B1NI1 (S)                    | B1NI1_S       |
| B1NI2 (S)                    | B1NI2_S       |

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|------------------------------|--------------|
| NTB name                     | TDB name     |
| B1NI3 (S)                    | B1NI3_S      |
| B7NI10 (S)                   | B7NI10_S     |
| B27NI35 (S)                  | B27NI35_S    |
| B2NI2O5 (S)                  | B2NI2O5_S    |
| B2NI3O6 (S)                  | B2NI3O6_S    |
| B1O1.5 (S)                   | B1O1_5_S     |
| B2O4SR1 (S)                  | B2O4SR1_S    |
| B2O5SR2 (S)                  | B2O5SR2_S    |
| B2O6SR3 (S)                  | B2O6SR3_S    |
| B4O7SR1 (S)                  | B4O7SR1_S    |
| B6O10SR1 (S)                 | B6O10SR1_S   |
| B1RU1 (S)                    | B1RU1_S      |
| B2RU1 (S)                    | B2RU1_S      |
| B3RU2 (S)                    | B3RU2_S      |
| B3RU7 (S)                    | B3RU7_S      |
| B3SI1 (S)                    | B3SI1_S      |
| B6SI1 (S)                    | B6SI1_S      |
| B14SI1 (S)                   | B14SI1_S     |
| B6SR1 (S)                    | B6SR1_S      |
| B2U1 (S)                     | B2U1_S       |
| B4U1 (S)                     | B4U1_S       |
| B12U1 (S)                    | B12U1_S      |
| B1ZR1 (S)                    | B1ZR1_S      |
| B2ZR1 (S)                    | B2ZR1_S      |
| B4ZR3 (S)                    | B4ZR3_S      |
| B12ZR1 (S)                   | B12ZR1_S     |
| BA1C2 (S)                    | BA1C2_S      |
| BA1C1O3 (C)                  | BA1C1O3_S    |
| BA1CR1O4 (S)                 | BA1CR1O4_S   |
| BA1CR2O4 (S)                 | BA1CR2O4_S   |
| BA3CR2O6 (S)                 | BA3CR2O6_S   |
| BA1FE2O4 (S)                 | BA1FE2O4_S   |
| BA1FE12O19 (S)               | BA1FE12O19_S |
| BA2FE2O5 (S)                 | BA2FE2O5_S   |
| BA2FE6O11 (S)                | BA2FE6O11_S  |
| BA7FE4O13 (S)                | BA7FE4O13_S  |
| BA1H2 (C)                    | BA1H2_S08    |
| BA1H2O2 (C)                  | BA1H2O2_S    |
| BA1IN1 (S)                   | BA1IN1_S     |
| BA1IN2 (S)                   | BA1IN2_S09   |
| BA1IN4 (S)                   | BA1IN4_S     |
| BA5IN2 (S)                   | BA5IN2_S10   |
| BA5IN3 (S)                   | BA5IN3_S     |
| BA13IN1 (S)                  | BA13IN1_S    |
| BA1IN2O4 (S)                 | BA1IN2O4_S   |
| BA2IN2O5 (S)                 | BA2IN2O5_S   |
| BA3IN2O6 (S)                 | BA3IN2O6_S   |

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| NTB name                     | TDB name     |
| BA4IN6O13 (S)                | BA4IN6O13_S  |
| BA5IN2O8 (S)                 | BA5IN2O8_S   |
| BA1LA2O4 (S)                 | BA1LA2O4_S   |
| BA1MG2 (S)                   | BA1MG2_S     |
| BA2MG17 (S)                  | BA2MG17_S    |
| BA6MG23 (S)                  | BA6MG23_S    |
| BA1NI1O2 (S)                 | BA1NI1O2_S   |
| BA3NI1O4 (S)                 | BA3NI1O4_S   |
| BA1O2 (S)                    | BA1O2_S      |
| BA1O3SI1 (S)                 | BA1O3SI1_S   |
| BA1O5SI2 (S)                 | BA1O5SI2_S   |
| BA2O4SI1 (S)                 | BA2O4SI1_S   |
| BA2O8SI3 (S)                 | BA2O8SI3_S   |
| BA3O5SI1 (S)                 | BA3O5SI1_S   |
| BA3O13SI5 (S)                | BA3O13SI5_S  |
| BA5O21SI8 (S)                | BA5O21SI8_S  |
| BA1O4U1 (S)                  | BA1O4U1_S    |
| BA1SI1 (S)                   | BA1SI1_S     |
| BA1SI2 (S)                   | BA1SI2_S     |
| BA2SI1 (S)                   | BA2SI1_S     |
| BA3SI4 (S)                   | BA3SI4_S     |
| BA5SI3 (S)                   | BA5SI3_S     |
| C1 (S) Graphite              | C_S18        |
| C2CA1 (S)                    | C2CA1_S12    |
| C2CA1MG1O6 (S)               | C2CA1MG1O6_S |
| C1CA1O3 (C)                  | C1CA1O3_S    |
| C2CR3 (S)                    | C2CR3_S      |
| C6CR1O6 (S)                  | C6CR1O6_S    |
| C1FE1O3 (S)                  | C1FE1O3_S    |
| C5FE1O5 (L)                  | C5FE1O5_L    |
| C1H4 (L)                     | C1H4_L11     |
| C2H6 (L)                     | C2H6_L13     |
| C3H6 (L)                     | C3H6_L14     |
| C3H8 (L)                     | C3H8_L15     |
| C1H2O2 (L)                   | C1H2O2_L     |
| C1H4O1 (L)                   | C1H4O1_L     |
| C2H4O2 (L)                   | C2H4O2_L     |
| C2H6O1 (L)                   | C2H6O1_L     |
| C2H6O2 (L)                   | C2H6O2_L     |
| C3H6O1 (L)                   | C3H6O1_L     |
| C3H6O2 (L)                   | C3H6O2_L     |
| C3H8O1 (L)                   | C3H8O1_L     |
| C3H8O3 (L)                   | C3H8O3_L     |
| C2LA1 (S) LT                 | C2LA1_S      |
| C2MG1 (S)                    | C2MG1_S      |
| C3MG2 (S)                    | C3MG2_S      |
| C1MG1O3 (C)                  | C1MG1O3_S    |

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|---------------------------------|------------------|
| NTB name                        | TDB name         |
| C1NI1O3 (S)                     | C1NI1O3_S        |
| C4NI1O4 (L)                     | C4NI1O4_L        |
| C1O3SR1 (C)                     | C1O3SR1_S        |
| C1O5U1 (S)                      | C1O5U1_S         |
| C2RU1U2 (S)                     | C2RU1U2_S        |
| C1SI1 (S)                       | C1SI1_S          |
| C2SI2U3 (S)                     | C2SI2U3_S        |
| C3SI16U20 (S)                   | C3SI16U20_S      |
| C2SR1 (S)                       | C2SR1_S          |
| C3U2 (S)                        | C3U2_S           |
| CA1CR1O4 (S)                    | CA1CR1O4_S       |
| CA1CR2O4 (S) HT                 | CA1CR2O4_S1      |
| CA1CR2O4 (S) LT                 | CA1CR2O4_S2      |
| CA2CR13O20 (S)                  | CA2CR13O20_S     |
| CA1CR1O10SI4 (S) Gillespite     | CA1CR1O10SI4_S   |
| CA3CR2O12SI3 (S) Uvarovite      | CA3CR2O12SI3_S   |
| CA1FE3O5 (S) (S)                | CA1FE3O5_S       |
| CA1FE4O7 (S)                    | CA1FE4O7_S       |
| CA1FE5O7 (S)                    | CA1FE5O7_S       |
| CA1FE1O6SI2 (S) Hedenbergite    | CA1FE1O6SI2_S    |
| CA1H2 (C)                       | CA1H2_S16        |
| CA2H2MG5O24SI8 (S) Tremolite    | CA2H2MG5O24SI8_S |
| CA1H2O2 (S)                     | CA1H2O2_S        |
| CA1H4O7SI2 (S)                  | CA1H4O7SI2_S     |
| CA2H5O10.5SI3 (S)               | CA2H5O10_5SI3_S  |
| CA3H6O10SI2 (S)                 | CA3H6O10SI2_S    |
| CA4H3O11.5SI3 (S)               | CA4H3O11_5SI3_S  |
| CA5H6O20SI6 (S)                 | CA5H6O20SI6_S    |
| CA5H11O22.5SI6 (S)              | CA5H11O22_5SI6_S |
| CA5H21O27.5SI6 (S)              | CA5H21O27_5SI6_S |
| CA6H2O19SI6 (S)                 | CA6H2O19SI6_S    |
| CA12H14O31SI6 (S)               | CA12H14O31SI6_S  |
| CA1IN1 (S)                      | CA1IN1_S         |
| CA1IN2 (S)                      | CA1IN2_S         |
| CA3IN1 (S)                      | CA3IN1_S         |
| CA1MG2 (S)                      | CA1MG2_S         |
| CA2MG1O7SI2 (S) Akermanite      | CA2MG1O7SI2_S    |
| CA3MG1O8SI2 (S) Merwinite       | CA3MG1O8SI2_S    |
| CA1NI2 (S)                      | CA1NI2_S         |
| CA1NI3 (S)                      | CA1NI3_S         |
| CA1NI5 (S)                      | CA1NI5_S         |
| CA2NI7 (S)                      | CA2NI7_S         |
| CA1O2 (S)                       | CA1O2_S          |
| CA1O3SI1 (S) Pseudowollastonite | CA1O3SI1_S       |
| CA2O4SI1 (S) Larnite            | CA2O4SI1_S       |
| CA3O5SI1 (S) Hatrurite          | CA3O5SI1_S       |
| CA3O7SI2 (S) Rankinite          | CA3O7SI2_S       |

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|------------------------------|----------------|
| NTB name                     | TDB name       |
| CA2012SI4ZR1 (S)             | CA2012SI4ZR1_S |
| CA309SI2ZR1 (S)              | CA309SI2ZR1_S  |
| CA104U1 (S)                  | CA104U1_S      |
| CA103ZR1 (S)                 | CA103ZR1_S     |
| CA1SI1 (S)                   | CA1SI1_S       |
| CA1SI2 (S)                   | CA1SI2_S       |
| CA2SI1 (S)                   | CA2SI1_S       |
| CR1LA103 (S)                 | CR1LA103_S     |
| CR102 (S)                    | CR102_S        |
| CR103 (C)                    | CR103_S        |
| CR5012 (S)                   | CR5012_S       |
| CR8021 (S)                   | CR8021_S       |
| CR301ZR3 (S)                 | CR301ZR3_S     |
| CR2RU1 (S)                   | CR2RU1_S       |
| CR3RU1 (S)                   | CR3RU1_S       |
| CR1SI1 (S)                   | CR1SI1_S       |
| CR1SI2 (S)                   | CR1SI2_S       |
| CR3SI1 (S)                   | CR3SI1_S       |
| CR5SI3 (S)                   | CR5SI3_S       |
| FE1H102 (S) Goethite         | FE1H102_S      |
| FE1H202 (S)                  | FE1H202_S      |
| FE1H303 (S)                  | FE1H303_S      |
| FE1LA103 (S)                 | FE1LA103_S     |
| FE12LA1019.5 (S)             | FE12LA1019_5_S |
| FE1NI3 (S)                   | FE1NI3_S       |
| FE205SR2 (S)                 | FE205SR2_S     |
| FE206SR3 (S)                 | FE206SR3_S     |
| FE10022SR7 (S)               | FE10022SR7_S   |
| FE12019SR1 (S)               | FE12019SR1_S   |
| FE104U1 (S)                  | FE104U1_S      |
| FE1SI1 (S)                   | FE1SI1_S       |
| FE1SI2 (S)                   | FE1SI2_S       |
| FE2SI1 (S)                   | FE2SI1_S       |
| FE3SI7 (S)                   | FE3SI7_S       |
| FE5SI3 (S)                   | FE5SI3_S       |
| FE1U6 (S)                    | FE1U6_S        |
| FE4U3ZR5 (S)                 | FE4U3ZR5_S     |
| FE6U71ZR23 (S)               | FE6U71ZR23_S   |
| FE25U9ZR16 (S)               | FE25U9ZR16_S   |
| FE1ZR2 (S)                   | FE1ZR2_S       |
| FE1ZR3 (S)                   | FE1ZR3_S       |
| FE73ZR27 (S)                 | FE73ZR27_S     |
| H2LA1 (S)                    | H2LA1_S        |
| H3LA103 (S)                  | H3LA103_S      |
| H2MG1 (S)                    | H2MG1_S19      |
| H2MG102 (S)                  | H2MG102_S      |
| H2MG3012SI4 (S)              | H2MG3012SI4_S  |
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|------------------------------|---------------|
| NTB name                     | TDB name      |
| H2MG7O24SI8 (S)              | H2MG7O24SI8_S |
| H4MG3O9SI2 (S)               | H4MG3O9SI2_S  |
| H2O1 (L)                     | H2O1_L        |
| H2O2SR1 (C)                  | H2O2SR1_S     |
| H2O4U1 (S)                   | H2O4U1_S      |
| H4O5U1 (S)                   | H4O5U1_S      |
| H6SI2 (S)                    | H6SI2_S       |
| H2SR1 (C)                    | H2SR1_S       |
| H3U1 (S)                     | H3U1_S        |
| H2ZR1 (S)                    | H2ZR1_S       |
| IN1LA1 (S)                   | IN1LA1_S      |
| IN1LA2 (S)                   | IN1LA2_S      |
| IN1LA3 (S)                   | IN1LA3_S      |
| IN2LA1 (S)                   | IN2LA1_S      |
| IN3LA1 (S)                   | IN3LA1_S      |
| IN5LA3 (S)                   | IN5LA3_S      |
| IN1MG2 (S)                   | IN1MG2_S      |
| IN1MG3 (S)                   | IN1MG3_S      |
| IN2MG5 (S)                   | IN2MG5_S      |
| IN7MG3 (S)                   | IN7MG3_S      |
| IN1NI1 (S)                   | IN1NI1_S      |
| IN1NI2 (S)                   | IN1NI2_S      |
| IN1NI3 (S)                   | IN1NI3_S      |
| IN3NI2 (S)                   | IN3NI2_S      |
| IN7NI3 (S)                   | IN7NI3_S      |
| IN21NI29 (S)                 | IN21NI29_S    |
| IN2O3 (S)                    | IN2O3_S       |
| IN2O4SR1 (S)                 | IN2O4SR1_S    |
| IN1SR1 (S)                   | IN1SR1_S      |
| IN1SR3 (S)                   | IN1SR3_S      |
| IN2SR1 (S)                   | IN2SR1_S      |
| IN2SR3 (S)                   | IN2SR3_S      |
| IN3SR1 (S)                   | IN3SR1_S      |
| IN3SR2 (S)                   | IN3SR2_S      |
| IN5SR1 (S)                   | IN5SR1_S      |
| IN5SR2 (S)                   | IN5SR2_S      |
| IN3U1 (S)                    | IN3U1_S       |
| IN1ZR1 (S)                   | IN1ZR1_S      |
| IN1ZR2 (S)                   | IN1ZR2_S      |
| IN1ZR3 (S)                   | IN1ZR3_S      |
| IN2ZR1 (S)                   | IN2ZR1_S      |
| IN3ZR1 (S)                   | IN3ZR1_S      |
| LA1MG1 (S)                   | LA1MG1_S20    |
| LA1MG2 (S)                   | LA1MG2_S      |
| LA1MG12 (S)                  | LA1MG12_S     |
| LA2MG17 (S)                  | LA2MG17_S     |
| LA5MG41 (S)                  | LA5MG41_S     |

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| NTB name                     | TDB name    |
| LA1NI1 (S)                   | LA1NI1_S    |
| LA1NI3 (S)                   | LA1NI3_S    |
| LA1NI5 (S)                   | LA1NI5_S    |
| LA2NI3 (S)                   | LA2NI3_S    |
| LA2NI7 (S)                   | LA2NI7_S    |
| LA3NI1 (S)                   | LA3NI1_S    |
| LA5NI19 (S)                  | LA5NI19_S   |
| LA7NI3 (S)                   | LA7NI3_S    |
| LA7NI16 (S)                  | LA7NI16_S   |
| LA2O5SI1 (S)                 | LA2O5SI1_S  |
| LA2O7SI2 (S)                 | LA2O7SI2_S  |
| LA4O12SI3 (S)                | LA4O12SI3_S |
| LA4O7SR1 (S)                 | LA4O7SR1_S  |
| LA4O9SR3 (S)                 | LA4O9SR3_S  |
| LA2O5ZR1 (S)                 | LA2O5ZR1_S  |
| LA2O7ZR2 (S)                 | LA2O7ZR2_S  |
| LA1RU2 (S)                   | LA1RU2_S    |
| LA3RU1 (S)                   | LA3RU1_S    |
| LA5RU2 (S)                   | LA5RU2_S    |
| LA5RU3 (S)                   | LA5RU3_S    |
| LA7RU3 (S)                   | LA7RU3_S    |
| LA1SI1 (S)                   | LA1SI1_S    |
| LA1SI2 (S)                   | LA1SI2_S    |
| LA3SI2 (S)                   | LA3SI2_S    |
| MG1NI2 (S)                   | MG1NI2_S    |
| MG2NI1 (S)                   | MG2NI1_S    |
| MG1O3SI1 (S) Clinoenstatite  | MG1O3SI1_S1 |
| MG1O3SI1 (S) Enstatite       | MG1O3SI1_S2 |
| MG1O3SI1 (S) Proenstatite    | MG1O3SI1_S3 |
| MG1O4U1 (S)                  | MG1O4U1_S   |
| MG2SI1 (S)                   | MG2SI1_S    |
| MG2SR1 (S)                   | MG2SR1_S    |
| MG17SR2 (S)                  | MG17SR2_S   |
| MG23SR6 (S)                  | MG23SR6_S   |
| MG38SR9 (S)                  | MG38SR9_S   |
| NI2O4SI1 (S)                 | NI2O4SI1_S  |
| NI1SI1 (S)                   | NI1SI1_S    |
| NI2SI1 (S)                   | NI2SI1_S    |
| NI3SI1 (S) HT                | NI3SI1_S1   |
| NI3SI1 (S) MT                | NI3SI1_S2   |
| NI3SI2 (S)                   | NI3SI2_S    |
| NI7SI13 (S)                  | NI7SI13_S   |
| NI29SI9 (S) LT               | NI29SI9_S   |
| NI31SI12 (S)                 | NI31SI12_S  |
| NI1SR1 (S)                   | NI1SR1_S    |
| NI1U6 (S)                    | NI1U6_S     |
| NI2U1 (S)                    | NI2U1_S     |

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| NTB name                     | TDB name   |
| NI5U1 (S)                    | NI5U1_S    |
| NI7U5 (S)                    | NI7U5_S    |
| NI9U7 (S)                    | NI9U7_S    |
| NI39U11 (S)                  | NI39U11_S  |
| NI77U23 (S)                  | NI77U23_S  |
| NI1ZR1 (S)                   | NI1ZR1_S   |
| NI1ZR2 (S)                   | NI1ZR2_S   |
| NI3ZR1 (S)                   | NI3ZR1_S   |
| NI5ZR1 (S)                   | NI5ZR1_S   |
| NI7ZR2 (S)                   | NI7ZR2_S   |
| NI11ZR9 (S)                  | NI11ZR9_S  |
| NI21ZR8 (S)                  | NI21ZR8_S  |
| NI23ZR17 (S)                 | NI23ZR17_S |
| O2RU1 (S)                    | O2RU1_S    |
| O2SI1 (S) Cristobalite       | O2SI1_S1   |
| O2SI1 (S) Quartz_HT          | O2SI1_S2   |
| O2SI1 (S) Quartz_LT          | O2SI1_S3   |
| O2SI1 (S) Tridymite          | O2SI1_S4   |
| O3SI1SR1 (S)                 | O3SI1SR1_S |
| O4SI1SR2 (S)                 | O4SI1SR2_S |
| O5SI1SR3 (S)                 | O5SI1SR3_S |
| O2SR1 (S)                    | O2SR1_S    |
| O4SR2ZR1 (S)                 | O4SR2ZR1_S |
| O7SR3ZR2 (S)                 | O7SR3ZR2_S |
| O3U1 (S)                     | O3U1_S     |
| O8U3 (S)                     | O8U3_S     |
| O9U4 (S)                     | O9U4_S     |
| O2ZR1 (S) Monoclinic         | O2ZR1_S    |
| RU1SI1 (S)                   | RU1SI1_S   |
| RU2SI1 (S)                   | RU2SI1_S   |
| RU2SI3 (S)                   | RU2SI3_S   |
| RU4SI3 (S)                   | RU4SI3_S   |
| RU5SI3 (S)                   | RU5SI3_S   |
| RU1U2 (S)                    | RU1U2_S    |
| RU4U3 (S)                    | RU4U3_S    |
| RU5U3 (S)                    | RU5U3_S    |
| RU12U13 (S) LT               | RU12U13_S1 |
| RU12U13 (S) HT               | RU12U13_S2 |
| RU1ZR1 (S)                   | RU1ZR1_S   |
| RU2ZR1 (S)                   | RU2ZR1_S   |
| SI1SR1 (S)                   | SI1SR1_S   |
| SI1SR2 (S)                   | SI1SR2_S   |
| SI2SR1 (S) LT                | SI2SR1_S   |
| SI3SR5 (S)                   | SI3SR5_S   |
| SI1U3 (S) HT                 | SI1U3_S1   |
| SI1U3 (S) LT                 | SI1U3_S2   |
| SI1.88U1 (S)                 | SI1_88U1_S |

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| NTB name                     | TDB name           |
| <b>SI3U1 (S)</b>             | <b>SI3U1_S</b>     |
| <b>SI5U3 (S)</b>             | <b>SI5U3_S</b>     |
| <b>SI511U489 (S)</b>         | <b>SI511U489_S</b> |
| <b>SI1ZR1 (S)</b>            | <b>SI1ZR1_S</b>    |
| <b>SI1ZR2 (S)</b>            | <b>SI1ZR2_S</b>    |
| <b>SI1ZR3 (S)</b>            | <b>SI1ZR3_S</b>    |
| <b>SI2ZR1 (S)</b>            | <b>SI2ZR1_S</b>    |
| <b>SI2ZR3 (S)</b>            | <b>SI2ZR3_S</b>    |
| <b>SI3ZR5 (S)</b>            | <b>SI3ZR5_S</b>    |
| <b>SI4ZR5 (S)</b>            | <b>SI4ZR5_S</b>    |

### 1.3 Condensed Solutions

| NTB name           | mult | atoms                                        | TDB name              |
|--------------------|------|----------------------------------------------|-----------------------|
| <b>ALPHAP_C2S</b>  | 1    | Ca, O, Si, Mg                                | <b>ALPHAP_C2S</b>     |
| <b>ALPHA_C2S</b>   | 1    | Ca, O, Si, Mg                                | <b>ALPHA_C2S_SS04</b> |
| <b>Al12Mg17_SS</b> | 1    | Al, Mg                                       | <b>Al12Mg17_SS</b>    |
| <b>Al13Fe4_SS</b>  | 1    | Al, Fe                                       | <b>Al13Fe4_SS</b>     |
| <b>Al8Fe5_SS</b>   | 1    | Al, Fe                                       | <b>Al8Fe5_SS</b>      |
| <b>B4C</b>         | 1    | B, C                                         | <b>B4C_SS06</b>       |
| <b>BCC_A2 (1)</b>  | 2    | Al, C, Cr, Fe, In, La, Mg, Ni, Ru, Si, U, Zr | <b>BCC_A2_1</b>       |
| <b>BCC_A2 (2)</b>  | 2    | Ag, C, Al, Cr, Fe, In, Ni, Ru, Si, U, Zr, O  | <b>BCC_A2_2</b>       |
| <b>BCC_A2 (3)</b>  | 1    | Ba, Ca, Sr                                   | <b>BCC_A2_3</b>       |
| <b>BCC_A2 (4)</b>  | 1    | Ag, C, Ca, In, La, Mg                        | <b>BCC_A2_4</b>       |
| <b>BCC_A2 (5)</b>  | 1    | In, Ni                                       | <b>BCC_A2_5</b>       |
| <b>BCC_A2 (6)</b>  | 1    | Ag, Al, In, Mg                               | <b>BCC_A2_6</b>       |
| <b>BCT_U</b>       | 1    | C, U, O                                      | <b>BCT_U</b>          |
| <b>BETA_B</b>      | 1    | B, C, Si                                     | <b>BETA_B</b>         |
| <b>C2AF</b>        | 1    | Al, Ca, O, Fe                                | <b>C2AF</b>           |
| <b>C2La_SS</b>     | 1    | C, La                                        | <b>C2La_SS</b>        |
| <b>C3AF</b>        | 1    | Al, Ca, O, Fe                                | <b>C3AF</b>           |
| <b>C3La2_SS</b>    | 1    | C, La                                        | <b>C3La2_SS</b>       |
| <b>CA2F2</b>       | 1    | Al, Ca, O, Fe                                | <b>CA2F2</b>          |
| <b>CA6F6</b>       | 1    | Al, Ca, O, Fe                                | <b>CA6F6</b>          |
| <b>CAF</b>         | 2    | Al, Ca, O, Fe                                | <b>CAF_SS17</b>       |
| <b>CAF3</b>        | 1    | Al, Ca, O, Fe                                | <b>CAF3</b>           |
| <b>CC_La2O3</b>    | 1    | Ba, O, Ca, La, Sr, Zr                        | <b>CC_La2O3</b>       |
| <b>CEMENTITE</b>   | 1    | B, Cr, Fe, Ni, C                             | <b>CEMENTITE</b>      |
| <b>CORUNDUM</b>    | 2    | Al, O, Cr, Fe, Zr                            | <b>CORUNDUM</b>       |
| <b>CUB_A13</b>     | 1    | Ag, Al                                       | <b>CUB_A13</b>        |
| <b>DELTA_UZr2</b>  | 1    | U, Zr                                        | <b>DELTA_UZr2</b>     |
| <b>DHCP</b>        | 1    | La, Mg                                       | <b>DHCP</b>           |
| <b>DIA_A4</b>      | 1    | B, Ru, Si, Sr                                | <b>DIA_A4</b>         |
| <b>DIOPSIDE</b>    | 1    | Ca, Mg, O, Si                                | <b>DIOPSIDE</b>       |
| <b>FCC_A1 (1)</b>  | 1    | Ag, C, Al, Cr, Fe, In, Ni, Ru, Si, U, Zr     | <b>FCC_A1_1</b>       |

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|------------------------------|------|--------------------------------------------------------------------|----------------------|
| NTB name                     | mult | atoms                                                              | TDB name             |
| <b>FCC_A1 (2)</b>            | 1    | Ag, Al, In, Mg                                                     | <b>FCC_A1_2</b>      |
| <b>FCC_A1 (3)</b>            | 1    | Ba, Ca, La, Sr                                                     | <b>FCC_A1_3</b>      |
| <b>FCC_A1 (4)</b>            | 1    | Ag, C, Ba, Ca, In, La, Mg                                          | <b>FCC_A1_4</b>      |
| <b>FCC_B1 (1)</b>            | 1    | Ca, O, Fe, Mg, Ni, Sr                                              | <b>FCC_B1_1</b>      |
| <b>FCC_B1 (2)</b>            | 1    | Al, O, Ca, Cr, Fe, Mg, Ni, Si                                      | <b>FCC_B1_2</b>      |
| <b>FCC_B1 (3)</b>            | 2    | Ba, O, Ca, Fe, Mg, Ni, Sr, Zr                                      | <b>FCC_B1_3</b>      |
| <b>FCC_B1 (4)</b>            | 2    | C, U, Zr, O                                                        | <b>FCC_B1_4</b>      |
| <b>FCC_C1</b>                | 2    | Ba, O, Ca, Cr, Fe, In, La, Mg, Sr, U, Zr                           | <b>FCC_C1</b>        |
| <b>FCC_L10</b>               | 1    | In, Mg                                                             | <b>FCC_L10</b>       |
| <b>FCC_L12</b>               | 1    | In, Mg                                                             | <b>FCC_L12</b>       |
| <b>HCP_A3 (1)</b>            | 2    | Ag, C, Al, Cr, Fe, In, La, Mg, Ni, Ru, U, Zr, O                    | <b>HCP_A3_1</b>      |
| <b>HCP_A3 (2)</b>            | 1    | Ag, Al, In                                                         | <b>HCP_A3_2</b>      |
| <b>HCP_A3 (3)</b>            | 1    | In, Ni                                                             | <b>HCP_A3_3</b>      |
| <b>LAVES_C14</b>             | 1    | Cr, Zr                                                             | <b>LAVES_C14</b>     |
| <b>LAVES_C15 (1)</b>         | 2    | Cr, Fe, U, Zr                                                      | <b>LAVES_C15_1</b>   |
| <b>LIQUID</b>                | 3    | Ag, Al, O, Si, Ca, B, Ba, La, Sr, C, Cr, Fe, In, Mg, Ni, U, Zr, Ru | <b>LIQUID</b>        |
| <b>LaMg3_SS</b>              | 1    | La, Mg                                                             | <b>LaMg3_SS</b>      |
| <b>M23C6_BC</b>              | 1    | B, Fe, C                                                           | <b>M23C6_BC</b>      |
| <b>M23C6_CrFeNi</b>          | 1    | C, Cr, Fe, Ni                                                      | <b>M23C6_CrFeNi</b>  |
| <b>M7C3</b>                  | 1    | C, Cr, Fe, Ni                                                      | <b>M7C3</b>          |
| <b>MULLITE</b>               | 1    | Al, B, O, Si                                                       | <b>MULLITE</b>       |
| <b>OLIVINE</b>               | 2    | Ca, O, Si, Fe, Mg                                                  | <b>OLIVINE</b>       |
| <b>ORT_A20</b>               | 1    | Fe, Si, U, Zr                                                      | <b>ORT_A20</b>       |
| <b>PEROVSKITE</b>            | 1    | Ba, O, U, Zr, Sr                                                   | <b>PEROVSKITE</b>    |
| <b>Ru3U_SS</b>               | 1    | C, Ru, U                                                           | <b>Ru3U_SS</b>       |
| <b>SIGMA</b>                 | 1    | Cr, Fe, Ni                                                         | <b>SIGMA</b>         |
| <b>SPINEL</b>                | 1    | Al, Fe, O, Mg, Ni, Cr                                              | <b>SPINEL</b>        |
| <b>Si2Sr_SS_HT</b>           | 1    | Si, Sr                                                             | <b>Si2Sr_SS_HT</b>   |
| <b>Si2U3_SS</b>              | 1    | C, Si, U                                                           | <b>Si2U3_SS</b>      |
| <b>TCHERNOBYLITE</b>         | 1    | O, Si, U, Zr                                                       | <b>TCHERNOBYLITE</b> |
| <b>TET_A6</b>                | 1    | In, Mg                                                             | <b>TET_A6</b>        |
| <b>TET_METAL</b>             | 1    | Al, Cr, Fe, Ru, Si, U, Zr                                          | <b>TET_METAL</b>     |
| <b>TET_OXIDE</b>             | 1    | Ba, O, Ca, Cr, Fe, In, La, Mg, U, Zr                               | <b>TET_OXIDE</b>     |
| <b>WOLLASTONITE</b>          | 2    | Ca, O, Si, Fe, Mg                                                  | <b>WOLLASTONITE</b>  |

## 1.4 Gas

| NTB name               | TDB name  |
|------------------------|-----------|
| AG1 (G)                | AG        |
| AG2 (G)                | AG2       |
| AG1O1 (G)              | AG1O1     |
| AL1 (G)                | AL        |
| AL2 (G)                | AL2       |
| AL1B1O2 (G)            | AL1B1O2   |
| AL1C1 (G)              | AL1C1     |
| AL1C2 (G)              | AL1C2     |
| AL2C2 (G)              | AL2C2     |
| AL1H1 (G)              | AL1H1     |
| AL1H2 (G)              | AL1H2     |
| AL1H3 (G)              | AL1H3     |
| AL1H1O1 (G) 1          | AL1H1O1_1 |
| AL1H1O1 (G) 2          | AL1H1O1_2 |
| AL1H1O2 (G)            | AL1H1O2   |
| AL1H2O2 (G)            | AL1H2O2   |
| AL1O1 (G)              | AL1O1     |
| AL1O2 (G)              | AL1O2     |
| AL2O1 (G)              | AL2O1     |
| AL2O2 (G)              | AL2O2     |
| AL2O3 (G)              | AL2O3     |
| AR1 (G)                | AR        |
| B1 (G)                 | B         |
| B2 (G)                 | B2        |
| B1BA1O2 (G)            | B1BA1O2   |
| B1C1 (G)               | B1C1      |
| B1C2 (G)               | B1C2      |
| B2C1 (G)               | B2C1      |
| B1H1 (G)               | B1H1      |
| B1H2 (G)               | B1H2      |
| B1H3 (G)               | B1H3      |
| B2H6 (G)               | B2H6      |
| B5H9 (G)               | B5H9      |
| B10H14 (G)             | B10H14    |
| B1H1O1 (G) 1           | B1H1O1_1  |
| B1H1O1 (G) 2           | B1H1O1_2  |
| B1H1O2 (G)             | B1H1O2    |
| B1H2O1 (G)             | B1H2O1    |
| B1H2O2 (G)             | B1H2O2    |
| B1H3O1 (G)             | B1H3O1    |
| B1H3O2 (G)             | B1H3O2    |
| B1H3O3 (G)             | B1H3O3    |
| B2H4O4 (G)             | B2H4O4    |
| B3H3O3 (G)             | B3H3O3    |
| B3H3O6 (G)             | B3H3O6    |
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|------------------------------|----------|
| NTB name                     | TDB name |
| B101 (G)                     | B101     |
| B102 (G)                     | B102     |
| B201 (G)                     | B201     |
| B202 (G)                     | B202     |
| B203 (G)                     | B203     |
| B102SR1 (G)                  | B102SR1  |
| BA1 (G)                      | BA       |
| BA1H1 (G)                    | BA1H1    |
| BA1H101 (G)                  | BA1H101  |
| BA1H202 (G)                  | BA1H202  |
| BA101 (G)                    | BA101    |
| BA201 (G)                    | BA201    |
| C1 (G)                       | C        |
| C2 (G)                       | C2       |
| C3 (G)                       | C3       |
| C4 (G)                       | C4       |
| C5 (G)                       | C5       |
| C6CR106 (G)                  | C6CR106  |
| C5FE105 (G)                  | C5FE105  |
| C1H1 (G)                     | C1H1     |
| C1H2 (G)                     | C1H2     |
| C1H3 (G)                     | C1H3     |
| C1H4 (G)                     | C1H4     |
| C2H1 (G)                     | C2H1     |
| C2H2 (G)                     | C2H2     |
| C2H3 (G)                     | C2H3     |
| C2H4 (G)                     | C2H4     |
| C2H5 (G)                     | C2H5     |
| C2H6 (G)                     | C2H6     |
| C3H4 (G) 1                   | C3H4_1   |
| C3H4 (G) 2                   | C3H4_2   |
| C3H4 (G) 3                   | C3H4_3   |
| C3H6 (G) 1                   | C3H6_1   |
| C3H6 (G) 2                   | C3H6_2   |
| C3H7 (G) 1                   | C3H7_1   |
| C3H7 (G) 2                   | C3H7_2   |
| C3H8 (G)                     | C3H8     |
| C1H101 (G)                   | C1H101   |
| C1H102 (G)                   | C1H102   |
| C1H201 (G)                   | C1H201   |
| C1H202 (G) C                 | C1H202_1 |
| C1H202 (G) T                 | C1H202_2 |
| C1H301 (G) 1                 | C1H301_1 |
| C1H301 (G) 2                 | C1H301_2 |
| C1H401 (G)                   | C1H401   |
| C2H201 (G)                   | C2H201   |
| C2H202 (G)                   | C2H202   |
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|------------------------------|-----------|
| NTB name                     | TDB name  |
| C2H4O1 (G) 1                 | C2H4O1_1  |
| C2H4O1 (G) 2                 | C2H4O1_2  |
| C2H4O2 (G) 1                 | C2H4O2_1  |
| C2H4O2 (G) 2                 | C2H4O2_2  |
| C2H4O4 (G)                   | C2H4O4    |
| C2H6O1 (G) 1                 | C2H6O1_1  |
| C2H6O1 (G) 2                 | C2H6O1_2  |
| C2H6O2 (G)                   | C2H6O2    |
| C3H4O1 (G) 1                 | C3H4O1_1  |
| C3H4O1 (G) 2                 | C3H4O1_2  |
| C3H4O1 (G) 3                 | C3H4O1_3  |
| C3H4O2 (G) 1                 | C3H4O2_1  |
| C3H4O2 (G) 2                 | C3H4O2_2  |
| C3H4O3 (G)                   | C3H4O3    |
| C3H6O1 (G) 1                 | C3H6O1_1  |
| C3H6O1 (G) 2                 | C3H6O1_2  |
| C3H6O1 (G) 3                 | C3H6O1_3  |
| C3H6O1 (G) 4                 | C3H6O1_4  |
| C3H6O1 (G) 5                 | C3H6O1_5  |
| C3H6O2 (G)                   | C3H6O2    |
| C3H6O3 (G)                   | C3H6O3    |
| C3H8O1 (G) 1                 | C3H8O1_1  |
| C3H8O1 (G) 2                 | C3H8O1_2  |
| C3H8O1 (G) 3                 | C3H8O1_3  |
| C2H6O1SI1 (G)                | C2H6O1SI1 |
| C2H8SI1 (G)                  | C2H8SI1   |
| C4NI1O4 (G)                  | C4NI1O4   |
| C1O1 (G)                     | C1O1      |
| C1O2 (G)                     | C1O2      |
| C2O1 (G)                     | C2O1      |
| C3O2 (G)                     | C3O2      |
| C1SI1 (G)                    | C1SI1     |
| C1SI2 (G)                    | C1SI2     |
| C1SI3 (G)                    | C1SI3     |
| C1SI4 (G)                    | C1SI4     |
| C2SI1 (G)                    | C2SI1     |
| C2SI2 (G)                    | C2SI2     |
| C2SI3 (G)                    | C2SI3     |
| CA1 (G)                      | CA        |
| CA2 (G)                      | CA2       |
| CA1H1 (G)                    | CA1H1     |
| CA1H1O1 (G)                  | CA1H1O1   |
| CA1H2O2 (G)                  | CA1H2O2   |
| CA1O1 (G)                    | CA1O1     |
| CR1 (G)                      | CR        |
| CR2 (G)                      | CR2       |
| CR1O1 (G)                    | CR1O1     |

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|------------------------------|----------|
| NTB name                     | TDB name |
| CR1O2 (G)                    | CR1O2    |
| CR1O3 (G)                    | CR1O3    |
| FE1 (G)                      | FE       |
| FE2 (G)                      | FE2      |
| FE1H2O2 (G)                  | FE1H2O2  |
| FE1O1 (G)                    | FE1O1    |
| H1 (G)                       | H        |
| H2 (G)                       | H2       |
| H1IN1 (G)                    | H1IN1    |
| H1IN1O1 (G)                  | H1IN1O1  |
| H1MG1 (G)                    | H1MG1    |
| H1MG1O1 (G)                  | H1MG1O1  |
| H2MG1O2 (G)                  | H2MG1O2  |
| H1NI1 (G)                    | H1NI1    |
| H2NI1O2 (G)                  | H2NI1O2  |
| H1O1 (G)                     | H1O1     |
| H1O2 (G)                     | H1O2     |
| H2O1 (G)                     | H2O1     |
| H2O2 (G)                     | H2O2     |
| H1O1RU1 (G)                  | H1O1RU1  |
| H2O2RU1 (G)                  | H2O2RU1  |
| H2O3SI1 (G)                  | H2O3SI1  |
| H4O4SI1 (G)                  | H4O4SI1  |
| H1O1SR1 (G)                  | H1O1SR1  |
| H2O2SR1 (G)                  | H2O2SR1  |
| H1SI1 (G)                    | H1SI1    |
| H2SI1 (G)                    | H2SI1    |
| H3SI1 (G)                    | H3SI1    |
| H4SI1 (G)                    | H4SI1    |
| H6SI2 (G)                    | H6SI2    |
| H1SR1 (G)                    | H1SR1    |
| H1ZR1 (G)                    | H1ZR1    |
| IN1 (G)                      | IN       |
| IN2 (G)                      | IN2      |
| IN1O1 (G)                    | IN1O1    |
| IN2O1 (G)                    | IN2O1    |
| LA1 (G)                      | LA       |
| LA1O1 (G)                    | LA1O1    |
| LA2O1 (G)                    | LA2O1    |
| LA2O2 (G)                    | LA2O2    |
| MG1 (G)                      | MG       |
| MG2 (G)                      | MG2      |
| MG1O1 (G)                    | MG1O1    |
| NI1 (G)                      | NI       |
| NI1O1 (G)                    | NI1O1    |
| O1 (G)                       | O        |
| O2 (G)                       | O2       |
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|------------------------------|--------------|
| NTB name                     | TDB name     |
| <b>O3 (G)</b>                | <b>O3</b>    |
| <b>O1RU1 (G)</b>             | <b>O1RU1</b> |
| <b>O2RU1 (G)</b>             | <b>O2RU1</b> |
| <b>O3RU1 (G)</b>             | <b>O3RU1</b> |
| <b>O4RU1 (G)</b>             | <b>O4RU1</b> |
| <b>O1SI1 (G)</b>             | <b>O1SI1</b> |
| <b>O2SI1 (G)</b>             | <b>O2SI1</b> |
| <b>O2SI2 (G)</b>             | <b>O2SI2</b> |
| <b>O1SR1 (G)</b>             | <b>O1SR1</b> |
| <b>O1U1 (G)</b>              | <b>O1U1</b>  |
| <b>O2U1 (G)</b>              | <b>O2U1</b>  |
| <b>O3U1 (G)</b>              | <b>O3U1</b>  |
| <b>O1ZR1 (G)</b>             | <b>O1ZR1</b> |
| <b>O2ZR1 (G)</b>             | <b>O2ZR1</b> |
| <b>RU1 (G)</b>               | <b>RU</b>    |
| <b>SI1 (G)</b>               | <b>SI</b>    |
| <b>SI2 (G)</b>               | <b>SI2</b>   |
| <b>SI3 (G)</b>               | <b>SI3</b>   |
| <b>SR1 (G)</b>               | <b>SR</b>    |
| <b>SR2 (G)</b>               | <b>SR2</b>   |
| <b>U1 (G)</b>                | <b>U</b>     |
| <b>ZR1 (G)</b>               | <b>ZR</b>    |
| <b>ZR2 (G)</b>               | <b>ZR2</b>   |

## 2 Assessed Systems

### 2.1 Binary Systems

| assessed binary systems |         |         |         |         |         |         |         |         |
|-------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Ag – Al                 | Ag – B  | Ag – Ba | Ag – C  | Ag – Ca | Ag – Cr | Ag – Fe | Ag – In | Ag – La |
| Ag – Mg                 | Ag – Ni | Ag – O  | Ag – Ru | Ag – Si | Ag – Sr | Ag – U  | Ag – Zr | Al – B  |
| Al – Ba                 | Al – C  | Al – Ca | Al – Cr | Al – Fe | Al – In | Al – La | Al – Mg | Al – Ni |
| Al – O                  | Al – Ru | Al – Si | Al – Sr | Al – U  | Al – Zr | B – Ba  | B – C   | B – Ca  |
| B – Cr                  | B – Fe  | B – In  | B – La  | B – Mg  | B – Ni  | B – O   | B – Ru  | B – Si  |
| B – Sr                  | B – U   | B – Zr  | Ba – C  | Ba – Ca | Ba – Cr | Ba – Fe | Ba – In | Ba – La |
| Ba – Mg                 | Ba – Ni | Ba – O  | Ba – Ru | Ba – Si | Ba – Sr | Ba – U  | Ba – Zr | C – Ca  |
| C – Cr                  | C – Fe  | C – In  | C – La  | C – Mg  | C – Ni  | C – O   | C – Ru  | C – Si  |
| C – Sr                  | C – U   | C – Zr  | Ca – Cr | Ca – Fe | Ca – In | Ca – La | Ca – Mg | Ca – Ni |
| Ca – O                  | Ca – Ru | Ca – Si | Ca – Sr | Ca – U  | Ca – Zr | Cr – Fe | Cr – In | Cr – La |
| Cr – Mg                 | Cr – Ni | Cr – O  | Cr – Si | Cr – Ru | Cr – Sr | Cr – U  | Cr – Zr | Fe – In |
| Fe – La                 | Fe – Mg | Fe – Ni | Fe – O  | Fe – Ru | Fe – Si | Fe – Sr | Fe – U  | Fe – Zr |
| In – La                 | In – Mg | In – Ni | In – O  | In – Ru | In – Si | In – Sr | In – U  | In – Zr |
| La – Mg                 | La – Ni | La – O  | La – Ru | La – Si | La – Sr | La – U  | La – Zr | Mg – Ni |
| Mg – O                  | Mg – Ru | Mg – Si | Mg – Sr | Mg – U  | Mg – Zr | Ni – O  | Ni – Ru | Ni – Si |
| Ni – Sr                 | Ni – U  | Ni – Zr | O – Ru  | O – Si  | O – Sr  | O – U   | O – Zr  | Ru – Si |
| Ru – Sr                 | Ru – U  | Ru – Zr | Si – Sr | Si – U  | Si – Zr | Sr – U  | Sr – Zr | U – Zr  |

## 2.2 Ternary Systems

| system      | assessed sub-systems                                                  |
|-------------|-----------------------------------------------------------------------|
| Al – B – O  | Al <sub>2</sub> O <sub>3</sub> – B <sub>2</sub> O <sub>3</sub>        |
| Al – Ba – O | Al <sub>2</sub> O <sub>3</sub> – BaO                                  |
| Al – Ca – O | Al <sub>2</sub> O <sub>3</sub> – CaO                                  |
| Al – Cr – O | Al <sub>2</sub> O <sub>3</sub> – Cr <sub>2</sub> O <sub>3</sub>       |
| Al – Fe – O | Al <sub>2</sub> O <sub>3</sub> – FeO – Fe <sub>2</sub> O <sub>3</sub> |
| Al – In – O | Al <sub>2</sub> O <sub>3</sub> – In <sub>2</sub> O <sub>3</sub>       |
| Al – La – O | Al <sub>2</sub> O <sub>3</sub> – La <sub>2</sub> O <sub>3</sub>       |
| Al – Mg – O | Al <sub>2</sub> O <sub>3</sub> – MgO                                  |
| Al – Ni – O | Al <sub>2</sub> O <sub>3</sub> – NiO                                  |
| Al – O – Si | Al <sub>2</sub> O <sub>3</sub> – SiO <sub>2</sub>                     |
| Al – O – Sr | Al <sub>2</sub> O <sub>3</sub> – SrO                                  |
| Al – O – U  | Al <sub>2</sub> O <sub>3</sub> – UO <sub>2</sub>                      |
| Al – O – Zr | Al <sub>2</sub> O <sub>3</sub> – ZrO <sub>2</sub>                     |
| B – Ba – O  | B <sub>2</sub> O <sub>3</sub> – BaO                                   |
| B – C – Fe  | full                                                                  |
| B – C – U   | full                                                                  |
| B – C – Zr  | full                                                                  |
| B – Ca – O  | B <sub>2</sub> O <sub>3</sub> – CaO                                   |
| B – Cr – O  | B <sub>2</sub> O <sub>3</sub> – Cr <sub>2</sub> O <sub>3</sub>        |
| B – Fe – O  | B <sub>2</sub> O <sub>3</sub> – FeO – Fe <sub>2</sub> O <sub>3</sub>  |
| B – Fe – U  | full                                                                  |
| B – Fe – Zr | full                                                                  |
| B – In – O  | B <sub>2</sub> O <sub>3</sub> – In <sub>2</sub> O <sub>3</sub>        |
| B – La – O  | B <sub>2</sub> O <sub>3</sub> – La <sub>2</sub> O <sub>3</sub>        |
| B – Mg – O  | B <sub>2</sub> O <sub>3</sub> – MgO                                   |
| B – Ni – O  | B <sub>2</sub> O <sub>3</sub> – NiO                                   |
| B – O – Si  | B <sub>2</sub> O <sub>3</sub> – SiO <sub>2</sub>                      |
| B – O – Sr  | B <sub>2</sub> O <sub>3</sub> – SrO                                   |
| B – O – U   | B <sub>2</sub> O <sub>3</sub> – UO <sub>2</sub>                       |
| B – O – Zr  | B <sub>2</sub> O <sub>3</sub> – ZrO <sub>2</sub>                      |
| Ba – Ca – O | BaO – CaO                                                             |
| Ba – Cr – O | BaO – Cr <sub>2</sub> O <sub>3</sub>                                  |
| Ba – Fe – O | BaO – FeO    BaO – Fe <sub>2</sub> O <sub>3</sub>                     |
| Ba – In – O | BaO – In <sub>2</sub> O <sub>3</sub>                                  |
| Ba – La – O | BaO – La <sub>2</sub> O <sub>3</sub>                                  |
| Ba – Mg – O | BaO – MgO                                                             |
| Ba – Ni – O | BaO – NiO                                                             |
| Ba – O – Si | BaO – SiO <sub>2</sub>                                                |
| Ba – O – Sr | BaO – SrO                                                             |
| Ba – O – U  | BaO – UO <sub>2</sub>                                                 |
| Ba – O – Zr | BaO – ZrO <sub>2</sub>                                                |
| C – Cr – Fe | full                                                                  |
| C – Cr – Ni | full                                                                  |
| C – Fe – Ni | full                                                                  |
| C – O – U   | full                                                                  |
| C – O – Zr  | full                                                                  |
| C – U – Zr  | full                                                                  |

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|------------------------------|------------------------------------------------------------------------------------------------------|
| system                       | assessed sub-systems                                                                                 |
| Ca – Cr – O                  | CaO – CrO – Cr <sub>2</sub> O <sub>3</sub>                                                           |
| Ca – Fe – O                  | CaO – FeO – Fe <sub>2</sub> O <sub>3</sub>                                                           |
| Ca – In – O                  | CaO – In <sub>2</sub> O <sub>3</sub>                                                                 |
| Ca – La – O                  | CaO – La <sub>2</sub> O <sub>3</sub>                                                                 |
| Ca – Mg – O                  | CaO – MgO                                                                                            |
| Ca – Ni – O                  | CaO – NiO                                                                                            |
| Ca – O – Si                  | CaO – SiO <sub>2</sub>                                                                               |
| Ca – O – Sr                  | CaO – SrO                                                                                            |
| Ca – O – U                   | CaO – UO <sub>2</sub>                                                                                |
| Ca – O – Zr                  | CaO – ZrO <sub>2</sub>                                                                               |
| Cr – Fe – O                  | full                                                                                                 |
| Cr – Fe – Ni                 | full                                                                                                 |
| Cr – Fe – Zr                 | full                                                                                                 |
| Cr – In – O                  | Cr <sub>2</sub> O <sub>3</sub> – In <sub>2</sub> O <sub>3</sub>                                      |
| Cr – La – O                  | Cr <sub>2</sub> O <sub>3</sub> – La <sub>2</sub> O <sub>3</sub>                                      |
| Cr – Mg – O                  | Cr <sub>2</sub> O <sub>3</sub> – MgO                                                                 |
| Cr – Ni – O                  | full                                                                                                 |
| Cr – O – Si                  | CrO – Cr <sub>2</sub> O <sub>3</sub> – SiO <sub>2</sub>                                              |
| Cr – O – Sr                  | Cr <sub>2</sub> O <sub>3</sub> – SrO                                                                 |
| Cr – O – U                   | Cr <sub>2</sub> O <sub>3</sub> – UO <sub>2</sub>                                                     |
| Cr – O – Zr                  | full                                                                                                 |
| Fe – In – O                  | FeO – In <sub>2</sub> O <sub>3</sub> Fe <sub>2</sub> O <sub>3</sub> – In <sub>2</sub> O <sub>3</sub> |
| Fe – La – O                  | FeO – La <sub>2</sub> O <sub>3</sub> Fe <sub>2</sub> O <sub>3</sub> – La <sub>2</sub> O <sub>3</sub> |
| Fe – Mg – O                  | FeO – MgO    Fe <sub>2</sub> O <sub>3</sub> – MgO                                                    |
| Fe – Ni – O                  | full                                                                                                 |
| Fe – O – Si                  | FeO – Fe <sub>2</sub> O <sub>3</sub> – SiO <sub>2</sub>                                              |
| Fe – O – Sr                  | FeO – SrO    Fe <sub>2</sub> O <sub>3</sub> – SrO                                                    |
| Fe – O – U                   | full                                                                                                 |
| Fe – O – Zr                  | full                                                                                                 |
| Fe – U – Zr                  | full                                                                                                 |
| In – La – O                  | In <sub>2</sub> O <sub>3</sub> – La <sub>2</sub> O <sub>3</sub>                                      |
| In – Mg – O                  | In <sub>2</sub> O <sub>3</sub> – MgO                                                                 |
| In – Ni – O                  | In <sub>2</sub> O <sub>3</sub> – NiO                                                                 |
| In – O – Si                  | In <sub>2</sub> O <sub>3</sub> – SiO <sub>2</sub>                                                    |
| In – O – Sr                  | In <sub>2</sub> O <sub>3</sub> – SrO                                                                 |
| In – O – U                   | In <sub>2</sub> O <sub>3</sub> – UO <sub>2</sub>                                                     |
| In – O – Zr                  | In <sub>2</sub> O <sub>3</sub> – ZrO <sub>2</sub>                                                    |
| La – Mg – O                  | La <sub>2</sub> O <sub>3</sub> – MgO                                                                 |
| La – Ni – O                  | La <sub>2</sub> O <sub>3</sub> – NiO                                                                 |
| La – O – Si                  | La <sub>2</sub> O <sub>3</sub> – SiO <sub>2</sub>                                                    |
| La – O – Sr                  | La <sub>2</sub> O <sub>3</sub> – SrO                                                                 |
| La – O – U                   | La <sub>2</sub> O <sub>3</sub> – UO <sub>2</sub>                                                     |
| La – O – Zr                  | La <sub>2</sub> O <sub>3</sub> – ZrO <sub>2</sub>                                                    |
| Mg – Ni – O                  | MgO – NiO                                                                                            |
| Mg – O – Si                  | MgO – SiO <sub>2</sub>                                                                               |
| Mg – O – Sr                  | MgO – SrO                                                                                            |
| Mg – O – U                   | MgO – UO <sub>2</sub>                                                                                |
| Mg – O – Zr                  | MgO – ZrO <sub>2</sub>                                                                               |
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|------------------------------|-------------------------------------|
| system                       | assessed sub-systems                |
| Ni – O – Si                  | NiO – SiO <sub>2</sub>              |
| Ni – O – Sr                  | NiO – SrO                           |
| Ni – O – U                   | NiO – UO <sub>2</sub>               |
| Ni – O – Zr                  | NiO – ZrO <sub>2</sub>              |
| O – Si – Sr                  | SrO – SiO <sub>2</sub>              |
| O – Si – U                   | SiO <sub>2</sub> – UO <sub>2</sub>  |
| O – Si – Zr                  | SiO <sub>2</sub> – ZrO <sub>2</sub> |
| O – Sr – U                   | SrO – UO <sub>2</sub>               |
| O – Sr – Zr                  | SrO – ZrO <sub>2</sub>              |
| O – U – Zr                   | full                                |

### 2.3 Quaternary Systems

| system           | assessed sub-systems                                                                     |
|------------------|------------------------------------------------------------------------------------------|
| Al – B – Ca – O  | Al <sub>2</sub> O <sub>3</sub> – B <sub>2</sub> O <sub>3</sub> – CaO                     |
| Al – B – O – Si  | Al <sub>2</sub> O <sub>3</sub> – B <sub>2</sub> O <sub>3</sub> – SiO <sub>2</sub>        |
| Al – B – O – Mg  | Al <sub>2</sub> O <sub>3</sub> – B <sub>2</sub> O <sub>3</sub> – MgO                     |
| Al – Ca – Fe – O | Al <sub>2</sub> O <sub>3</sub> – CaO – FeO – Fe <sub>2</sub> O <sub>3</sub>              |
| Al – Ca – O – Si | Al <sub>2</sub> O <sub>3</sub> – CaO – SiO <sub>2</sub>                                  |
| Al – Ca – O – Zr | Al <sub>2</sub> O <sub>3</sub> – CaO – ZrO <sub>2</sub>                                  |
| Al – Fe – O – Si | Al <sub>2</sub> O <sub>3</sub> – FeO – Fe <sub>2</sub> O <sub>3</sub> – SiO <sub>2</sub> |
| Al – O – Si – U  | Al <sub>2</sub> O <sub>3</sub> – SiO <sub>2</sub> – UO <sub>2</sub>                      |
| Al – O – Si – Zr | Al <sub>2</sub> O <sub>3</sub> – SiO <sub>2</sub> – ZrO <sub>2</sub>                     |
| Al – O – U – Ar  | Al <sub>2</sub> O <sub>3</sub> – UO <sub>2</sub> – ZrO <sub>2</sub>                      |
| B – Ca – Mg – O  | B <sub>2</sub> O <sub>3</sub> – CaO – MgO                                                |
| B – Ca – O – Si  | B <sub>2</sub> O <sub>3</sub> – CaO – SiO <sub>2</sub>                                   |
| B – Mg – O – Si  | B <sub>2</sub> O <sub>3</sub> – MgO – SiO <sub>2</sub>                                   |
| Ca – Cr – O – Si | CaO – CrO – Cr <sub>2</sub> O <sub>3</sub> – SiO <sub>2</sub>                            |
| Ca – Fe – O – Si | CaO – FeO – Fe <sub>2</sub> O <sub>3</sub> – SiO <sub>2</sub>                            |
| Ca – Mg – O – Zr | CaO – MgO – ZrO <sub>2</sub>                                                             |
| Ca – O – Si – Zr | CaO – SiO <sub>2</sub> – ZrO <sub>2</sub>                                                |
| O – Si – U – Zr  | SiO <sub>2</sub> – UO <sub>2</sub> – ZrO <sub>2</sub>                                    |