CC: P.M. Athree
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DAT/324-0

MEMO CP-C/55

T.J. Schmidt Terminal

To: Distribution

Date: April 25, 1979

From: T.W. Burrows TWB Brookhaven Nat. Lab.

Subject: United States CPND Compilation and Evaluation Activities.

Attachments: 1) Bibliography of Experimental CPND compiled by Lawrence Livermore Laboratory (R.J. Howerton et al.).

2) Table of CPND evaluations performed by Los Alamos Scientific Laboratory (G.M. Hale et al.).

We have the following additions to make to the list of CPND compilation activities provided in CP-D/81:

LLL (R.J. Howerton et al.): Compilation of charged-particle scattering data for targets and projectiles with $A \leq 4$. Ninety-nine references with approximately 10,000 data points have been compiled (Attachment 1). The data are in the Extended ECSIL Format (UCRL-50400, Vol. 1, Revision 3) and are available from the NNDC.

LASL (G.M. Hale et al.): Nineteen reactions of interest to fusion have been evaluated (Attachment 2). The data are in an ENDF-like format. The NNDC has requested additional details from Los Alamos. Currently the data are only available from Los Alamos.

NNDC: Compilation of experimental neutron-source data as detailed in CP-D/81 and letter of 1979/2/12. Compilation of evaluated neutron-source data will be coordinated with NDS.

(p,d) Evaluation of ^{11}C, ^{13}N, and ^{15}O production by protons ($E_p \leq 200$ MeV) incident on ^{12}C, ^{14}N, and ^{16}O. Compilation of experimental data will be required; however, compilation will be coordinated with KaChaPag and CAJaD.

Sol Pearlstein

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1h

Distribution:

2. N. Tubbs, NEA-DB
3./D J.J. Schmidt, NDS
4. V.N. Manokhin, CJD
A. F.E. Chukreev, CAJaD
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E. H. Tanaka, Study Group
G. Dearnaley, AERE
G.M. Hale, LASL
R.J. Howerton, LLL
H. Leeb, Austria
A. Marcinkowski, IBJ

10001 11 PHYS. REV. 81, 37 (1951) H.J.KARR, R.O.BONDELID, K.B.MATHER
21 (WASH. U.)
32 ONLY WEIGHTED AVERAGE C/S TAKEN.
10002 11 PHYS. REV. 82, 777 (1951) L.ROSEN, J.C.ALLRED (LASL)
22 DATA HAVE BEEN NUMERICALLY AVERAGED.
10003 11 PHYS. REV. 88, 253 (1952) R.J.S.BROWN, C.D.FREIER,
21 H.D.HOLMGREN, W.R.STRATTON, J.L.YARNELL (U.MINNESOTA)
10004 11 PHYS. REV. 88, 257 (1952) W.R.STRATTON, C.D.FREIER,
21 C.R.KEEPIN, D.RANKIN, T.F.STRATTON (U.MINNESOTA)
10005 11 PHYS. REV. 88, 425 (1952) J.C.ALLRED, A.H.ARMSTRONG,
21 A.M.HUDSON, R.M.POTTER, E.S.ROBINSON, L.ROSEN,
31 E.J.STOVALL,JR. (LASL)
10006 11 PHYS. REV. 88, 431 (1952) L.ROSEN, J.C.ALLRED (LASL)
10007 11 PHYS. REV. 96, 80 (1954) R.J.S.BROWN, K.F.FAMULARO,
21 H.D.HOLMGREN, D.RANKIN, T.F.STRATTON (U.MINNESOTA)
10008 11 PHYS. REV. 98, 586 (1955) A.CALONSKY, R.A.DOUGLAS,
21 W.HAEBERLI, M.T.MCELLISTREM, H.T.RICHARDS (U.WISCONSIN)
32 ALL DATA TAKEN FROM CURVES IN LA-2014 (1956). POINTS OVER THE
42 1.07 MEV RESONANCE ARE NOT EXPERIMENTAL POINTS BUT ARE PICKED
52 OFF THE CURVES SO THAT THEY ARE ROUGHLY LINEARLY
62 INTERPOLABLE. DATA AT LAB ANGLES OF 101.7, 113.1, 125.5 AND
72 147.5 DEGREES OVER THE RESONANCE IS VERY SIMILAR TO THAT AT
82 155.6 DEGREES.
10009 11 PHYS. REV. 117, 1307 (1960) J.E.BROLLEY,JR., T.M.PUTNAM,
21 L.ROSEN, L.STEWART (LASL)
10010 11 PHYS. REV. 154, 935 (1967) T.A.TOMBRELLO, R.J.SPICER,
21 A.D.BACHER (CALIF.INST.TECH.)
10011 11 PHYS. REV. C, 4, 17 (1971) R.L.HUTSON, N.JARMIE,
21 J.L.DETCH,JR., J.H.JETT (LASL)
10012 11 PHYS. REV. C, 4, 52 (1971) J.L.DETCH,JR., R.L.HUTSON,
21 N.JARMIE, J.H.JETT (LASL)
32 ERRORS TAKEN ARE RELATIVE. THERE IS ALSO A SCALE ERROR
42 OF 0.7-0.8 PERCENT.
10013 11 PHYS. REV. C, 1, 1615 (1970) C.C.JACOBS,JR., R.E.BROWN
21 (U.MINNESOTA)
32 ERRORS TAKEN ARE SCALE. THERE ARE ALSO RELATIVE ERRORS
42 ABOUT THE SAME ORDER OF MAGNITUDE.
10014 11 PHYS. REV. C, 1, 1622 (1970) J.C.JENKIN, W.D.HARRISON,
21 R.E.BROWN (U.MINNESOTA)
32 ERRORS TAKEN ARE SCALE. THERE ARE ALSO RELATIVE ERRORS ABOUT
42 THE SAME ORDER OF MAGNITUDE.
10015 11 PHYS. REV. C, 10, 54 (1974) N.JARMIE, J.H.JETT (LASL)
10016 11 PHYS. REV. C, 3, 1769 (1971) J.H.JETT, J.L.DETCH,JR.,
21 N.JARMIE (LASL)
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21 (U.MINNESOTA)
10019 11 NUCLEAR PHYS. 246, 76 (1975) K.IMAI, K.NISIMURA, N.TAMURA,
21 H.SATO (JAPAN)
10020 11 PHYS. REV. 81, 593 (1951) J.ROUVINA (U.ROCHESTER)
10021 11 PHYS. REV. 82, 126 (1951) K.B.MATHER (ENGLAND)
22 CROSS SECTIONS FOR ANGLES LESS THAN 22 DEGREES (CM) MAY
32 BE VERY UNCERTAIN.
10022 11 PHYS. REV. 82, 133 (1951) K.B.MATHER (WASH.U.)
10023 11 PHYS. REV. 82, 589 (1951) R.S.CLAASSEN, R.J.S.BROWN,
21 C.D.FREIER, W.R.STRATTON (U.MINNESOTA)
10024 11 PHYS. REV. 82, 786 (1951) J.C.ALLRED, D.K.FROMAN,
21 A.M.HUDSON, L.ROSEN (LASL)
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23 UCRL-1447 (1951)

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        21 R.O.BONDELID, L.ROSEN (LASL)
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10028   11 PHYS. REV. 90, 899 (1953) H.R.WORTHINGTON, J.N.MCGRUER,
        21 D.E.FINDLEY (U.WISC.)
10029   11 PHYS. REV. 91, 438 (1953) G.R.BRIGGS, S.SINGER,
        21 W.K.JENTSCHKE (U.ILLINOIS)
        32 DATA TAKEN FROM LA-2014 (1956)
        43 PHYS. REV. 91, 438 (1953)
10030   11 PHYS. REV. 92, 660 (1953) F.E.STEIGEST, M.B.SAMPSON
        21 (INDIANA U.)
        32 DATA NOT EXPERIMENTAL POINTS BUT ARE TAKEN FROM CURVES IN
        42 LA-2014 (1956) SO THAT THEY ARE ROUGHLY LINEARLY INTERPOLABLE
10031   11 PHYS. REV. 92, 1501 (1953) T.LAURITSEN, T.HUUS,
        21 S.G.NILSSON (DENMARK)
10032   11 PHYS. REV. 93, 825 (1954) G.FREIER, H.HOLMGREN
        21 (U.MINNESOTA)
        32 DATA TAKEN FROM LA-2014 (1956).
10033   11 PHYS. REV. 93, 837 (1954) W.E.KREGER, W.JENTSCHKE,
        21 P.G.KRUGER (U.ILLINOIS)
10034   11 PHYS. REV. 93, 928 (1954) K.F.FAMULARO, R.J.S.BROWN,
        21 H.D.HOLMGREN, T.F.STRATTON (U.MINNESOTA)
        32 DATA TAKEN FROM LA-2014 (1956).
10035   11 PHYS. REV. 95, 772 (1954) M.E.ENNIS, A.HEMMENDINGER (LASL)
10036   11 PHYS. REV. 95, 1226 (1954) J.L.YNTEMA, M.G.WHITE
        21 (PRINCETON U.)
10037   11 PHYS. REV. 96, 1322 (1954) E.J.ZIMMERMAN, R.O.KERMAN,
        21 S.SINGER, P.G.KRUGER, W.JENTSCHKE (U.ILLINOIS)
10038   11 PHYS. REV. 98, 28 (1955) D.O.CALDWELL, J.R.RICHARDSON
        21 (U.C.L.A.)
10039   11 PHYS. REV. 100, 960 (1955) G.C.PHILLIPS, J.L.RUSSELL,
        21 C.W.REICH (RICE)
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10041   11 NUCLEAR PHYS. 57, 624 (1964) L.S.SENHOUSE, T.A.TOMBRELLO
        21 (CALIF.INST.TECH.)
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10043   11 NUCLEAR PHYS. 110, 441 (1968) M.IVANOVICH, P.G.YOUNG,
        21 G.G.OHLSEN (AUSTRALIA)
10044   11 NUCLEAR PHYS. 132, 455 (1969) D.C.KOCHER, T.B.CLEGG
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10045   11 NUCLEAR PHYS. 130, 624 (1969) A.S.WILSON, M.C.TAYLOR,
        21 J.C.LEGG, G.C.PHILLIPS (RICE U.)
10046   11 NUCLEAR PHYS. 21, 189 (1960) W.T.H.VAN OERS, K.W.BROCKMAN,JR.
        21 (HOLLAND)
10047   11 NUCLEAR PHYS. 174, 399 (1971) L.S.CHUANG (HONG KONG)
10048   11 NUOVO CIMENTO 57, 340 (1968) C.MANDUCHI, G.MOSCHINI,
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10049   11 PHYS. REV. 55, 998 (1939) R.G.HERB, D.W.KERST, D.B.PARKINSON,
        21 G.J.PLAIN (U. WISC.)
        32 DATA TAKEN FROM LA-2014 (1956).
10050   11 PHYS. REV. 61, 13 (1942) R.F.TASCHEK (U. WISC.)
        22 DATA TAKEN FROM LA-2014 (1956). ABSOLUTE DATA OBTAINED BY
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        21 (U. COLORADO)
10052   11 PROC. ROY. SOC. (LONDON) 209, 489 (1951) H.B.BURROWS,
        21 W.M.GIBSON, J.ROTBLAT (ENGLAND)
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Att. 1 cont'd

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10053   11 PROC. ROY. SOC. (LONDON) 210, 534 (1952) E.J.BURGE,
        21 H.B.BURROWS, W.M.GIBSON, J.ROTBLAT (ENGLAND)
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10055   11 PHIL. MAG. 45, 1090 (1954) R.G.FREEMANTLE, T.GROTDAL,
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10057   11 NUCLEAR PHYS. 52, 134 (1964) G.G.OHLSEN, P.G.YOUNG
        21 (AUSTRALIA)
10058   11 PHYS. REV. 98, 56 (1955) J.H.WILLIAMS, S.W.RASMUSSEN
        21 (U. MINNESOTA)
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        21 P.G.KRUGER (U. ILLINOIS)
10062   11 PHYS. REV. 76, 1430 (1949) J.C.ALLRED, K.W.ERICKSON,
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10063   11 PHYS. REV. 75, 1678 (1949) J.M.BLAIR, G.FREIER, E.E.LAMPI,
        21 W.SLEATOR,JR. (U. MINNESOTA)
10064   11 PHYS. REV. 79, 577 (1950) F.E.FARIS, B.T.WRIGHT (UCLA)
10065   11 PHYS. REV. 75, 1345 (1949) G.FREIER, E.LAMPI, W.SLEATOR,
        21 J.H.WILLIAMS (U.MINNESOTA)
10066   11 PHYS. REV. 72, 1131 (1947) R.R.WILSON, E.J.LOFGEN,
        21 J.R.RICHARDSON, B.T.WRIGHT, R.S.SHANKLAND (U.C.BERKELEY)
10067   11 PHYS. REV. 72, 662 (1947) R.SHERR, J.M.BLAIR, H.R.KRATZ,
        21 C.L.BAILEY, R.F.TASCHEK (LASL)
10068   11 PHYS. REV. 74, 1594 (1948) J.M.BLAIR, G.FREIER, E.LAMPI,
        21 W.SLEATOR,JR., J.H.WILLIAMS (U. MINNESOTA)
        32 DEUTERON ENERGIES CORRECTED AS PER FOOTNOTE IN REF. 10063.
10069   11 PRIVATE COMMUNICATION (1956) HEYDENBURG, LITTLE
        22 DATA REPORTED IN LA-2014 (1956).
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        22 DATA REDUCED BY 20 PERCENT AS PER COMMENTS IN REF. 10091.
10071   11 PRIVATE COMMUNICATION (1956) R.H.LOVBERG (U. MINNESOTA)
        22 DATA REPORTED IN LA-2014 (1956).
10072   11 PHYS. REV. C, 11, 1905 (1975) J.R.MORALES, T.A.CAHILL,
        21 D.J.SHADOAN (U.C.,DAVIS)
        33 PRIVATE COMMUNICATION (1977) T.A.CAHILL
10073   11 J. PHYS. SOC. JAPAN 15, 9 (1960) S.KIKUCHI, J.SANADA,
        21 S.SUWA, I.HAYASHI, K.NISIMURA, K.FUKUNAGA (JAPAN)
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        21 S.MESSELT (U. WISC.)
        33 PHYS. REV. 114, 550 (1959)
10076   11 NUCLEAR PHYS. 132, 204 (1969) D.GARRETA, J.SURA, A.TARRATS
        21 (FRANCE)
        32 C/S HAVE BEEN MULTIPLIED BY 1.025 TO GIVE BEST
        42 NORMALIZATION TO PHASE SHIFT ANALYSIS. SEE REFERENCE.
10077   11 PHYS. REV. 102, 391 (1956) K.W.BROCKMAN,JR. (PRINCETON U.)
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        21 R.L.HUTSON (LASL)
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A4.1 cont'd

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        21 J.H.WILLIAMS (LASL)
10081   11 PHYS. REV. 116, 939 (1959) L.H.JOHNSTON, D.E.YOUNG
        21 (U. MINNESOTA)
10082   11 PHYS. REV. 174, 1122 (1968) R.J.SLOBODRIAN, H.E.CONZETT,
        21 E.SHIELD, W.F.TIVOL (LAWRENCE BERKELEY LAB)
        32 DATA TAKEN IS ENTITLED D IN THE REFERENCE.
10083   11 PHYS. REV. C, 4, 1499 (1971) T.A.CAHILL, J.GREENWOOD,
        21 H.WILLMES, D.J.SHADOAN (U.C.,DAVIS)
10084   11 PHYS. REV. LETTERS 25, 1346 (1970) R.E.BROWN, E.E.GROSS,
        21 A.VAN DER WOUDE (ORNL)
10085   11 PHYS. REV. C, 5, 1147 (1972) A.D.BACHER, G.R.PLATTNER,
        21 H.E.CONZETT, D.J.CLARK, H.GRUNDER, W.F.TIVOL
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10086   11 PHYS. REV. LETTERS 25, 1346 (1970) R.E.BROWN, E.E.GROSS,
        21 A.VAN DER WOUDE (ORNL)
10087   11 NUCLEAR PHYS. 119, 481 (1968) A.D.BACHER, R.J.SPIGER,
        21 T.A.TOMBRELLO (CALIF.INST.TECH.)
10088   11 HELV. PHYS. ACTA 46, 626 (1973) H.WASSMER, H.MUHRY
        21 (SWITZERLAND)
10089   11 NUCLEAR PHYS. 174, 301 (1971) R.GROTZSCHEL, B.KUHN,
        21 H.KUMPF, K.MOLLER, J.MOSNER (EAST GERMANY)
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        21 J.B.A.ENGLAND, D.EVANS, J.S.C.MCKEE, P.V.MARCH, E.M.MOSINGER,
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10091   11 PHYS. REV. 111, 1129 (1958) R.C.ALLEN, N.JARMIE (LASL)
        23 BULL. AM. PHYS. SOC. 2, 305 (1957)
10092   11 NUCLEAR PHYS. 263, 29 (1976) R.KANKOWSKY, J.C.FRITZ,
        21 K.KILIAN, A.NEUFERT, D.FICK (WEST GERMANY)
        33 PRIVATE COMMUNICATION (1977) D.FICK
10093   11 BULL. AM. PHYS. SOC. 1, 96 (1956) A.HEMMENDINGER (LASL)
        22 DATA REDUCED BY 20 PERCENT AS PER COMMENTS IN REF. 10091.
10094   11 NUCLEAR PHYS. 113, 461 (1968) S.N.BUNKER, J.M.CAMERON,
        21 R.F.CARLSON, J.R.RICHARDSON, P.TOMAS, W.T.H.VAN OERS,
        31 J.W.VERBA (U.C.L.A.)
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        21 J.L.CAMMEL, J.E.BROLLEY,JR., L.ROSEN, L.STEWART (LASL)
10096   11 J. PHYS. SOC. JAPAN 14, 1463 (1959) J.SANADA (JAPAN)
10097   11 PHYS. REV. 112, 2043 (1958) P.D.PHILLIPS, G.C.PHILLIPS
        21 (RICE INST.)
10098   11 PHYS. REV. C, 15, 518 (1977) D.C.DODDER, G.M.HALE, N.JARMIE,
        21 J.H.JETT, P.W.KEATON,JR., R.A.NISLEY, K.WITTE (LASL)
10099   11 NUCLEAR PHYS. 224, 45 (1974) L.KRAUS, I.LINCK (FRANCE)
        23 PRIVATE COMMUNICATION (1977) I.LINCK
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ADA. 1 cont'd

Attachment 2

CHARGED-PARTICLE REACTIONS FOR WHICH CROSS SECTIONS ARE AVAILABLE FROM CURRENT LASL R-MATRIX ANALYSES

Reaction	Energy Range (MeV)
$T(p,p)T$	E_p = 0-11
$T(p,n)^3He$	E_p = 1-11
$^3He(p,p)^3He$	E_p = 0-20
$^4He(p,p)^4He$	E_p = 0-30
$^6Li(p,p)^6Li$	E_p = 0-2.5
$^6Li(p,\alpha)^3He$	E_p = 0-2.5
$D(d,d)D$	E_d = 0-10
*$D(d,n)^3He$	E_d = 0-10
*$D(d,p)T$	E_d = 0-10
$T(d,d)T$	E_d = 0-8
$T(d,n)^4He$	E_d = 0-8
$^3He(d,d)^3He$	E_d = 0-10
$^3He(d,p)^4He$	E_d = 0-10
$^4He(d,d)^4He$	E_d = 0-15
$T(t,t)T$	E_t = 0-2
$T(t,2n)^4He$	E_t = 0-2
$^4He(t,t)^4He$	E_t = 0-14
†$^4He(t,n)^6Li$	E_t = 0-14
$^4He(^3He,^3He)^4He$	$E_{^3He}$ = 0-11

*Results preliminary.

†Results for inverse reaction already included in ^6Li ENDF evaluation.