

H. TRACY HALL
BIOGRAPHICAL SKETCH
20 April 1980

Hall, Howard Tracy

Current Address:

1711 North Lambert Lane, Provo, Utah 84601; Home Phone
(801) 373-0300; Office, Bldg. B-41, Brigham Young University,
Provo, Utah 84602; Phone (801) 378-4741.

Born: Ogden, Utah, 20 October 1919; parents: Howard & Florence
Tracy Hall.

Married: To Ida-Rose Langford, 24 September 1941 in Salt Lake
City, Utah.

Children: Sherlene (Bartholomew), Howard Tracy, Jr., David
Richard, Elizabeth (Neil), Virginia (Wood), Charlotte (Weight),
Nancy (Mecham).

Education: A.S. Weber College, Ogden, Utah, 1939; B.S., M.S.,
Ph.D., University of Utah, 1942, 1943, 1948 respectively with
major in physical chemistry and minor in physics. Special
wartime training in electronics at Bowden College, M.I.T.,
Harvard, and Honolulu Naval Base for a total of 11 months
while an ensign in the U.S. Navy, World War II.

Employment:

1955-1980, Brigham Young University, Provo, Utah: Distinguished
Professor of Chemistry and Chemical Engineering
Emeritus 1980--; Distinguished Professor of Chem-
istry 1967-1980; Distinguished Professor of Chem-
istry and Chemical Engineering 197 -1980; Director
of Research and Creative Endeavor for the entire
University and Professor of Chemistry 1955-1967.

1948-1955, General Electric Research Laboratory, Schenectady,
New York, Research Associate.

1942-1944 & 1946, United States Bureau of Mines Research
Laboratory, Salt Lake City, Utah, chemist.

1940-1942, Sperry Flour Mills, Ogden, Utah, Chemical Analyst
(part time)

1939-1940, Checketts Photo, Ogden, Utah, Photographer.

Military Service:

1944-1946, United States Navy, the first six weeks a Seaman First Class and the balance of the two years as Ensign.

Consulting:

1957-- for various governmental, industrial, and educational organizations (over 50 in number).

Business:

1966-- co-founder of Megadiamond Industries (current name) with Bill J. Pope and M. Duane Horton. President and Board Chairman 1966-1972; Vice President and Board Chairman 1972-1975; Vice President for Advanced Research 1980--.

1957-- H. Tracy Hall, Inc., President

Other Responsibilities: Director of the Brigham Young University High Pressure Laboratory, 1955-1980. Director of the National High Pressure Data Center run by Brigham Young University for the U.S. National Bureau of Standards, 1965-1980.

Professional Society Membership:

American Chemical Society, American Association for the Advancement of Science, American Physical Society, Sigma Xi, Phi Kappa Phi, Utah Academy of Science Arts and Letters, Timpanogos Club of Utah

Major Scientific Achievements:

1. The invention of the "Belt" high pressure/high temperature apparatus, U.S. patent No. 2,941,242 issued 21 June 1960. Conception and reduction to practice occurred in 1953 but issuance of the patent was delayed by a U.S. Government secrecy order based on the invention's importance.

This device can simultaneously maintain a pressure of one million pounds per square inch and a temperature of 2000 degrees centigrade. It is used throughout the world in the commercial manufacture of industrial diamond. An estimated one billion carats (about 200 tons) of diamond has been made since the Belt was invented. The Belt has been the subject of world-wide litigation, the most notable case being General Electric vs. the South African Chamber of Mines. This invention is the most highly cited invention in the field of high pressure and was so recognized in "This Week's Citation Classic", Current Contents, ISI Press 41, 14, 1980.

2. The first synthesis of diamonds, a feat that had eluded scientists for at least 150 years. The Belt made this possible. U.S. patents Nos. 2,947,608 & 2,947,610, 20 August 1960.

3. The invention of the tetrahedral press, U.S. patent No. 2,918,699, 29 December 1959. This invention circumvented the proprietary interest of the General Electric Company which prevented H. Tracy Hall from using the Belt for scientific research after leaving that company in 1955. It has the same pressure-temperature capabilities as the Belt. Note that the patent on this was granted before that on the Belt. This device also became subject to a U.S. Government secrecy order.

4. Sintered diamond, a synthetic carbonado first introduced to the world by Megadiamond Industries 24 September 1970. This type of material is rapidly revolutionizing the industrial diamond industry. U.S. patents 3,816,085; 3,829,544; 3,913,280, see Science, - 169, -868-69 (1970).

5. The determination of the first melting curve under high pressure, high temperature conditions. The material studied was germanium. See J. Phys. Chem. 59, 1144-1146 (1955)
6. The first high pressure, high temperature X-ray diffraction apparatus (with J. Dean Barnett) U.S. patent No. 3,249,7533. Also, see Rev. Sci. Instrum. 35, 175-182 (1964).
7. Discovery of the first pressure induced phase change from a close-packed to a non-close-packed structure (FCC to BCC in Ytterbium at 40kbar) with J. Dean Barnett and Leo Merrill. Such a change was thought to be impossible before this discovery. The article disclosing this transformation appeared in Science 139, 111-112 (1963) and was featured on the front cover of that issue.
8. The determination of the nature of the "resistance cusp" in cesium. This intriguing problem had remained unsolved since the discovery of the cusp by P. W. Bridgman in 1951 (with Leo Merrill and J. Dean Barnett) See Scienc, 146, 1297-1299 (1964)
9. The synthesis of over 100 rare earth compounds and polymorphs, impossible to synthesize by conventional means. They were prepared by the application of high pressure, high temperature techniques and are described in a series of 20 papers beginning with an article by Norman L. Eatough and H. Tracy Hall entitled "High Pressure Synthesis of Rare Earth Diantimonides", Inorg. Chem. 8, 1439 (1969)

Honors and Distinctions:

- 1980 Admitted to practice patent law before the U.S. Patent and Trademark office as an agent, registration number 29,800, June 23.
- 1980 "Man of the Year Award," Abrasive Engineering Society, Milwaukee, Wisconsin
- 1978 "Karl G. Maser Research Award," Brigham Young University, Provo, Utah August 31
- 1977 "International Prize for New Materials," The American Physical Society, San Diego, California, March 22
- 1975 "Distinguished Alumni Award," Weber State University, Ogden, Utah, October 16
- 1974 "IR-100 Award," Industrial Research Magazine for Indexible Sintered Diamond Tools, Chicago, October 8
- ~~1973 "Engineering Materials Achievement Award," The American Society for Metals, Chicago~~
- 1973 American Chemical Society Tour Speaker (Texas, Louisiana)
- 1973 The American Society for Metals "Engineering Materials Achievement Award," Chicago, October 2, Conrad Hilton Grand Ballroom
- ✓ 1972 American Chemical Society Tour Speaker (Oregon, Washington)
- ✓ 1972 Fellow, The American Institute of Chemists
- ✓ 1972 The Intermountain Society of Inventors and Designers "Certificate for Distinguished Service and Leadership in the Field of Invention and Designing," Salt Lake City, Utah, May 20
- ✓ 1972 Fellow, The Utah Academy of Science, Arts, and Letters
- ✓ 1972 The American Chemical Society "Award for Creative Invention," Boston, Massachusetts, April 10
- 1971 Honorary Doctor of Science Degree, Brigham Young University, Commencement Exercises, Provo, Utah, May 28
- ✓ 1971 "Outstanding Manhood Award," presented by Associated Men Students, Brigham Young University, Provo, Utah April 13
- ✓ 1970-1973 Member of National Academy of Science--National Research Council Evaluation Panel for the National Bureau of Standards Heat Division
- ✓ 1970 Cortez Honors Lecture, Weber State University, December 10, Ogden, Utah
- ✓ 1970 American Institute of Chemist's "Chemical Pioneer Award," Pittsburgh, Pennsylvania, May 16
- 1968- Member of Joint Army-Navy-Air Force Thermochemical Tables Advisory Group
- 1967- Distinguished Professor of Chemistry and Chemical Engineering, Brigham Young University

- 1967 Robert A. Welch Foundation, "Lecturer in Chemistry," Texas Universities
- 1966-1969 Member of Editorial Board, "The Review of Scientific Instruments"
- 1965 The American Chemical Society, Salt Lake Section's "Utah Award,"
University of Utah, Salt Lake City, December 9
- 1965 The National Association of Manufacturer's "Modern Pioneers in Creative
Industry Award," The Waldorf Astoria, New York City, December 2
- 1965 The Brigham Young University's "James E. Talmage Scientific Achievement
Award," Baccalaureate Exercises, Provo, Utah, May 27
- 1964 Third Annual "Olin Matheson Lecture," Yale University, New Haven,
Connecticut, April 22
- 1964 First "Annual Faculty Lecture," Brigham Young University, Provo, Utah,
April 8
- 1962 The American Society of Tool and Manufacturing Engineers "Research Medal,"
New York City
- 1961-1964 Member of Editorial Board, "Inorganic Chemistry"
- 1960-1961 President, Utah Academy of Sciences, Arts and Letters
- 1960 Fellow, American Association for the Advancement of Science
- 1959-1963 Alfred P. Sloan Foundation Research Fellow
- 1959 Chairman, Salt Lake Section, American Chemical Society
- 1954 First to synthesize diamond, December 16, G.E. Research Lab, Schenectady,
New York

PUBLICATIONS OF H. TRACY HALL

1. Graham W. Marks and H. Tracy Hall, "A Method for the Spectrochemical Determination of Germanium, Tin and Lead in Ore Samples," U. S. Bureau of Mines Report of Investigations No. R.I. 3965, Nov. 1946, 38 pp.
2. H. Tracy Hall and Henry Eyring, "The Constitution of Chromic Salts in Aqueous Solution," J. Am. Chem. Soc., 72, 782-790 (1950).
3. Graham W. Marks and H. Tracy Hall, "Transmission Characteristics in the Visible Spectral Region of the Quinalizarin and Beryllium - Quinalizarin Complex in N/4 Sodium Hydroxide Solution," U. S. Bureau of Mines Report of Investigations No. 4741, Oct. 1950, 5 pp.
4. H. Tracy Hall and Raymond M. Fuoss, "Empirical Analysis of Viscosity Data," J. Am. Chem. Soc., 73, 265-269 (1951).
5. H. Tracy Hall, "Molecular Weight of Polytrifluorochloroethylene by Light Scattering," J. Polymer. Sci., 7, 443-447 (1951).
6. H. Tracy Hall, Edward L. Brady and Paul D. Zeman, "Viscosity of Polytrifluorochloroethylene in O-Chlorobenzotrifluoride," J. Am. Chem. Soc., 73, 5460 (1951).
7. H. Tracy Hall, "The Solubility of Polytrifluorochloroethylene," J. Am. Chem. Soc., 74, 68-71 (1952).
8. H. Tracy Hall, "A New Method of Mounting Diamonds," Rev. Sci. Instrum., 25, 1035-1036 (1954).
9. F. P. Bundy, H. T. Hall, H. M. Strong and R. H. Wentorf, "Man-Made Diamonds," Nature, 176, 51-54 (1955).
10. H. Tracy Hall, "The Melting Point of Germanium as a Function of Pressure to 180,000 Atmospheres," J. Phys. Chem., 59, 1144-1146 (1955).
11. H. Tracy Hall, "Chemistry at High Temperature and High Pressure," Research and Engineering, 11, 27-28 (1956).
12. H. Tracy Hall, "Chemistry at High Temperature and High Pressure," High Temperature--A Tool for the Future, Stanford Research Institute, Menlo Park, California, 161-166 (1956).
13. H. Tracy Hall, "What the Sunday School has Done for Me," The Instructor, 91, 341 (1956).
14. H. Tracy Hall, "Chemistry at High Pressures and High Temperatures," J. Wash. Acad. Sci., 47, 300-304 (1957).
15. H. Tracy Hall, Billings Brown, Bruce Nelson and Lane A. Compton, "I. An Apparatus for Use with Condensed Phases at 10,000 Deg. II. Some Thermodynamic Considerations at Very High Temperatures," J. Phys. Chem., 62, 346-351 (1958).
16. H. Tracy Hall, "Some High Pressure, High Temperature Apparatus Design Considerations: Equipment for Use at 100,000 Atmospheres and 3000 Deg. C," Rev. Sci. Instrum., 29, 267-275 (1958).

17. H. Tracy Hall, "Ultrahigh Pressure Research," *Science*, 128, 445-449 (1958).
18. H. Tracy Hall and S. S. Kistler, "High Pressure Developments," Annual Review of Physical Chemistry, Annual Reviews, Inc., Palo Alto, California, 395-416 (1958).
19. H. Tracy Hall, "Diamonds," Proceedings of the Third Conference on Carbon (held at University of Buffalo, Buffalo, N. Y., June 1957), Pergamon Press, London, pp. 75-84.
20. H. Tracy Hall, "Ultrahigh Pressures," *Sci. American*, 201, 61-67 (1959).
21. H. Tracy Hall, "High Pressure Methods," Proceedings of an International Symposium on High Temperature Technology, Asilomar Conference Grounds, California, Oct. 6-9, 1959; Arranged by Stanford Research Institute, Menlo Park, California, McGraw-Hill, New York, pp. 145-156 and 355-336 (1960).
22. H. Tracy Hall, "Ultrahigh Pressure, High Temperature Apparatus: The Belt," *Rev. Sci. Instrum.*, 31, 125-131 (1960).
23. H. P. Bovenkerk, F. P. Bundy, H. T. Hall, H. M. Strong, and R. H. Wentorf, Jr., "The Preparation of Diamond," *Nature*, 184, 1094-1098 (1959).
24. J. Duane Dudley and H. Tracy Hall, "Experimental Fusion Curves of Indium and Tin to 105,000 Atmospheres," *Phys. Rev.*, 118, 1211-1216 (1960).
25. H. T. Hall, "Some High Pressure, High Temperature Apparatus Design Considerations: Equipment for use at 100,000 Atmospheres and 3000°C," Series of Selected Papers in Physics, Solid State Physics in High Pressure, The Physical Society of Japan, Dept. of Physics, University of Tokyo, Japan (1960), pp. 6-14, Reprinted from *Rev. Sci. Instrum.*, 29, 267-275 (1958).
26. H. Tracy Hall, "High Pressure Apparatus," Progress in Very High Pressure Research, Proceedings of an International Conference Held at Bolton Landing, New York, June 13-14, 1960, edited by Bundy, Hibbard, and Strong (John Wiley and Sons, Inc., Publishers), pp. 1-9 (1961).
27. H. Tracy Hall, "Possible Future Roles of the Utah Academy," Presidential Address, Proceedings, Utah Academy of Sciences, Arts and Letters, 38, 8-10 (1961).
28. H. Tracy Hall, "The Synthesis of Diamond," *J. Chem. Educ.*, 38, 484-489 (1961).
29. H. Tracy Hall, "Anvil Guide Device for Multiple-Anvil High Pressure Apparatus," *Rev. Sci. Instrum.*, 33, 1278-1280 (1962).
30. H. Tracy Hall, J. Dean Barnett and Leo Merrill, "Ytterbium: Transition at High Pressure from Face-Centered Cubic to Body-Centered Cubic Structure," *Science*, 139, 111-112 (1963).
31. H. Tracy Hall and Leo Merrill, "Some High Pressure Studies on Ytterbium," *Inorg. Chem.*, 2, 618-624 (1963).

32. H. Tracy Hall, "High Pressure, High Temperature," pp. 730-738, *Perspectives in Materials Research*, edited by L. Hinnel, J. J. Harwood, and W. J. Harris, Jr., Office of Naval Research, Dept. of the Navy, Washington, D. C., *Surveys of Naval Science*, No. 10, February 1963. (Note: This material was written four years before the book was published).
33. J. Dean Barnett, Roy B. Bennion, H. Tracy Hall, "High Pressure X-ray Diffraction Studies on Barium," *Science*, 141, 534-535 (1963).
34. H. T. Hall, "High Pressure Apparatus," in *The Physics of High Pressures*, edited by K. Swenson, (in Russian) published in Moscow (1963). This paper translated from my paper presented at the International High Pressure Conference held at Bolton Landing, New York, June 13-14, 1960.
35. J. Dean Barnett, Roy B. Bennion, H. Tracy Hall, "X-ray Diffraction Studies on Tin at High Pressure and High Temperature," *Science*, 141, 1041-2 (1963).
36. Donald R. Hall and H. Tracy Hall, "Missionary Diary of Helon Henry Tracy in the United States and Great Britain 1881-1882," private publication, 158 pp., 300 copies printed (1963).
37. H. Tracy Hall, "High Pressure/Temperature Apparatus," chapter 4 (pp. 133-179), *Metallurgy at High Pressures and High Temperatures*, edited by K. A. Gschneidner, Jr., M. T. Hepworth, and N. A. D. Parlee; Gordon and Breach Science Publishers, New York, 1964.
38. J. Dean Barnett and H. Tracy Hall, "High Pressure-High Temperature X-ray Diffraction Apparatus," *Rev. Sci. Instrum.*, 35, 175-182 (1964).
39. H. T. Hall, "Polymorphism and High Pressure," *B. Y. U. Studies*, 5, 139-153 (1964).
40. H. T. Hall, Guest Editorial, "High Pressure," *Experimental Mechanics*, 4, 3-A (1964).
41. H. T. Hall, L. Merrill and J. D. Barnett, "High Pressure Polymorphism in Cesium," *Science*, 146, 1297-1299 (1964).
42. H. T. Hall, "High Pressure Chemistry," in *Progress in Inorganic Chemistry*, Vol. 7, edited by F. A. Cotton, Interscience Publishers, pp. 1-38 (1966).
43. H. T. Hall, "Periodic Compounds: Syntheses at High Pressures and Temperatures," *Science*, 148, 1331-1333 (1965).
44. H. T. Hall and L. A. Compton, "Group IV Analogs and High Pressure, Temperature Synthesis of B₂O," *Inorg. Chem.*, 4, 1213-1216 (1965).
45. W. E. Evenson and H. T. Hall, "Volume Measurements on Chromium to 30 kilobars," *Science*, 150, 1164-1165 (1965).
46. J. D. Barnett, V. E. Bean, and H. T. Hall, "X-ray Diffraction Studies on Tin to 100 Kilobars," *Journal of Applied Physics*, 37, 875-877 (1966).
47. R. N. Jeffery, J. D. Barnett, H. Vanfleet, H. T. Hall, "A Pressure Scale to 100 Kilobar Based on Compression of Sodium Chloride," *J. Appl. Phys.*, 37, 3172-3180 (1966).

48. H. T. Hall, "Hydraulic Ram Design for Modern High Pressure Devices," *Rev. Sci. Instrum.*, 37, 568-571 (1966).
49. H. T. Hall, "A Tetrahedron Problem," *Math. Mag.*, 38, 241 (1965).
prob. No. 598.
50. H. T. Hall, "A Scientist Looks at the Miracles of Jesus," *The Instructor*, 101, 86-87 (1966).
51. H. T. Hall, "Transformations in Solids at High Pressure," Proceedings of Fourth Meeting, Cape Kennedy, Florida, March 16-18, 1966, Thermochemistry Working Group, Interagency Chemical Rocket Propulsion Group, Chemical Propulsion Information Agency, Publication No. 108, June 1966, Volume 1, pp. 67-74.
52. H. T. Hall, "High Temperatures, High Pressures, and Periodic Compounds," High-Temperature Chemistry, National Academy of Sciences, National Research Council Publication 1470, Washington, D. C., 1967, pp. 65-66.
53. H. T. Hall (Book), "High Pressures (to 100,000 Atmospheres at 1500 Deg. C)," American Institute of Chemical Engineers, Today Series, 345 West 47th St., New York, N. Y. 10017, (1967), 179 pp.
54. H. T. Hall, "High Pressure Apparatus: Ram-In-Tie-Bar Multianvil Presses," *Rev. Phys. Chem. Japan*, 37, 63-71 (1967).
55. R. B. Bennion, H. G. Miller, W. R. Myers, H. T. Hall, "100 Kbar Press for Time-of-Flight Neutron Diffraction," *Acta Cryst.*, 25A, S71 (1969).
56. N. L. Eatough and H. T. Hall, "High Pressure Synthesis of Rare Earth Diantimonides," *Inorg. Chem.*, 8, 1439 (1969).
57. N. L. Eatough, Alan W. Webb, and H. T. Hall, "High Pressure Th_3P_4 -Type Polymorphs of Rare Earth Sesquichalcogenides," *Inorg. Chem.*, 8, 2069-2071 (1969).
58. J. D. Barnett, J. Pack, and H. T. Hall, "Structure Determination of a Ferroelectric Phase of Sodium Nitrate Above 45 Kilobar," Proceedings of the Symposium on Crystal Structure at High Pressure at Pacific Science Center, Seattle, Washington, March 24, 1969, Transactions of the American Crystallographic Association, 5, 113-131 (1969), Available from Polycrystal Book Service, P. O. Box 11567, Pittsburg, Pennsylvania 15238.
59. N. L. Eatough and H. T. Hall, "High Pressure Synthesis of Lutetium Diantimonide," *Inorg. Chem.*, 9, 416-417 (1970).
60. N. L. Eatough and H. T. Hall, "High Pressure Th_3P_4 -Type Polymorphs of Rare Earth Sesquiselenides," *Inorg. Chem.*, 9, 417-418 (1970).
61. A. W. Webb and H. T. Hall, "High Pressure Synthesis of Rare Earth Polyselenides," *Inorg. Chem.*, 9, 843-847 (1970).
62. A. W. Webb and H. T. Hall, "High Pressure Synthesis of Rare Earth Polysulfides," *Inorg. Chem.*, 9, 1084 (1970).
63. H. T. Hall, "High Pressure Synthesis Involving Rare Earths," *Rev. Phys. Chem. Japan*, 39, 110-116 (1969).

64. J. F. Cannon and H. T. Hall, "High Pressure Synthesis of Selected Lanthanide-Tellurium Compounds," *Inorg. Chem.*, 9, 1639-1643 (1970).
65. H. T. Hall, "Personal Experiences in High Pressure," *The Chemist*, 47, 276-279 (1970), (Chemical Pioneer Address, American Institute of Chemists, Pittsburg, Pennsylvania, May 19, 1970).
66. H. T. Hall, "Sintered Diamond: A Synthetic Carbonado," *Science*, 169, 868-869 (1970).
67. H. T. Hall, "The Synthesis of Diamond," in Advances in Chemical Physics, Vol. XXI, entitled, "Chemical Dynamics," (papers in honor of Henry Eyring), Eds. Hirschfelder & Henderson, John Wiley, New York (1971), pp. 721-735.
68. H. Tracy Hall, "High Pressure Scale by X-ray Diffraction Techniques up to Approximately 100 kbar," in Accurate Characterization of the High-Pressure Environment, ed. E. C. Lloyd, U. S. Dept. of Commerce, National Bureau of Standards Special Publication 326 issued March 1971, pp. 303-306. Paper presented at the National Bureau of Standards Symposium, Gaithersburg, Md., October 14-18, 1968. Available from the U. S. Government Printing Office, Washington, D. C. 20402 (Order by Catalog No. C 13.10:326)
69. H. Tracy Hall, "Fixed Points Near Room Temperature," in Accurate Characterization of the High-Pressure Environment, ed. E. C. Lloyd, U. S. Dept. of Commerce, National Bureau of Standards Special Publication 326 issued March 1971, pp. 313-314. From National Bureau of Standards Symposium, Gaithersburg, Md., October 14-18, 1968. Available from the U. S. Govt. Printing Office, Washington, D. C. 20402 (Order by Catalog No. C 13.10:326).
70. F. William Linsley, Jr., Jerald S. Bradshaw and H. Tracy Hall, "High Pressure Affects on Conjugated Aromatic Compounds," *Rev. Phys. Chem. Japan*, 40, 69-72 (1970).
71. D. L. Decker, W. A. Bassett, L. Merrill, H. T. Hall and J. D. Barnett, "High Pressure Calibration: A Critical Review," *J. Phys. Chem. Ref. Data*, 1, 773-836 (1972).
72. Karl A. Miller and H. Tracy Hall, "High Temperature Synthesis of Rare Earth Tri-Tin Compounds," *Inorg. Chem.*, 11, 1188-1191 (1972).
73. J. F. Cannon, D. L. Robertson and H. T. Hall, "Synthesis of Lanthanide-Iron Laves Phases at High Pressures and Temperatures," *Mater. Res. Bull.*, 7, 5-12 (1972).
74. N. L. Eatough, H. T. Hall, "High Pressure Synthesis of $REMn_2$ Compounds with the $MgZn_2$ (Laves) Structure," *Inorg. Chem.*, 11, 2608-2609 (1972).
75. J. F. Cannon, D. L. Robertson, H. T. Hall, "The Effect of High Pressure on the Formation of LRu_2 and LOs_2 (L=Lanthanide) Compounds," *J. Less-Common Metals*, 29, 141-146 (1972).
76. D. L. Robertson, J. F. Cannon and H. T. Hall, "High Pressure and High Temperature Synthesis of $LaCo_2$," *Mat. Res. Bull.*, 7, 977- (1972).
77. J.M. Leger and H. Tracy Hall, "Pressure and Temperature Formation of A_3B Compounds. I. Nb_3Si and V_3Al ," *J. Less-Common Metals*, 32, 181-187 (1973).

78. J.M. Leger & H. Tracy Hall, Pressure & Temperature Formation of A_2B Compounds. II. Nb_3Ge , Nb_3Sn , Nb_3Pb , "J. Less-Common Metals", 34, 17-24 (1974)
79. Karl A. Miller and H. Tracy Hall, "High Pressure Synthesis of Lutetium Trilead," J. Less-Common Metals, 32, 275-78 (1973).
80. J. F. Cannon, D. L. Robertson, H. T. Hall and A. C. Lawson, "The Effect of High Pressure on the Crystal Structure of LaO_2 and CeO_2 ," J. Less-Common Metals, 31, 174 (1973).
81. A. C. Lawson, J. F. Cannon, D. L. Robertson and H. T. Hall, "Superconductivity of LaO_2 ," J. Less-Common Metals, 32, 173-74 (1973).
82. J. F. Cannon, D. L. Robertson, H. T. Hall and A. C. Lawson, "High Pressure Synthesis of Beta-W-Type Nb_2Te ," J. Phys. Chem. Solids, 35, 1181-82 (1974).
83. M. D. Horton, B. J. Pope and H. T. Hall, "Sintered Diamond," International Industrial Diamond Association Symposium, Washington, D. C. (1974).
84. B. J. Pope, M. D. Horton, H. T. Hall, L. S. Bowman and H. Adaniya, "Sintered Diamond: Its Possible Use as a High Thermal Conductivity Semiconductor Device Substrate," Proc. 4th International Conference on High Pressure (AIRAPT), Kyoto, Japan (1974).
85. B. J. Pope, M. D. Horton, H. T. Hall and S. DiVita, "Selection and Treatment of Diamond Particulates in Preparation for High Thermal Conductivity Ceramics by Sintering at High Temperature and Ultra-high Pressure," Proc. Ninth Annual University Conference on Ceramic Science of the American Ceramic Society, Orlando, Florida (1975).
86. J. F. Cannon and H. T. Hall, "Effect of High Pressure on the Crystal Structures of Lanthanide Trialuminides," J. Less-Common Metals, 40, 313-28 (1975).
87. H. Tracy Hall, "Retraction System for Multi-anvil Presses," Rev. Sci. Instrum., 46, 436-38 (1975).
88. H. Tracy Hall, "Sintered Diamond," Bringham Young University Studies, 16, 43-47 (1975) [Special Centennial Issue].
89. J. F. Cannon, D. M. Cannon, and H. T. Hall, "High Pressure Synthesis of SrB_2 and Gd_2B_{12} ," J. Less Common Metals 56, 83-90, (1977).
90. J. F. Cannon, H. T. Hall, "High Pressure Synthesis of Lanthanide/Boron and Actinide/Boron Compounds," in Rare Earths in Modern Science and Technology, edited by G. J. McCarthy and J. J. Rhyne, Plenum Press, New York & London (1978) pp. 219-224.
91. Chapter I, "Introduction" to Chemical Experimentation Under Extreme Conditions, Techniques of Chemistry, Vol IX, Eds. A. Weissberger and B. Rossiter, John Wiley & Sons (1980) pp. 1-8.
92. Chapter II, "High Pressure Techniques", Ibid. pp. 9-72.
93. H.T. Hall, This Week's Citation Classic, Ultra-high pressure, High-temperature Apparatus: The "Belt," Current Contents, ISI Press, 41, 14 (1980).

PATENTS OF H. TRACY HALL

1. U. S. 2,728,651, December 27, 1955. "Diamond Abrasive Wheel."
Assignee: General Electric Company.
2. U. S. 2,918,699, December 29, 1959.
"High Pressure Press" (Tetrahedral Anvil Apparatus)
Assignee: Research Corporation
Foreign Patents and Numbers:

Great Britain	847,067
Canada	622,429
3. U. S. 2,941,242, June 21, 1960.
"High Temperature - High Pressure Apparatus."
Assignee: General Electric Company.
Foreign Patents and Numbers:

Canada	624,376
England	830,209
4. U. S. 2,941,248, June 1, 1960.
"High Temperature - High Pressure Apparatus" (The Belt)
Assignee: General Electric Company
Foreign Patents and Numbers:

Argentina	122,934
Australia	244,497
Belgium	582,483
France	1,243,894
Holland	108,063
Italy	615,588
Japan	311,237
Israel	16,123
South Africa	3549/59
Switzerland	377,319
5. U. S. 2,941,250, June 21, 1960. "Reaction Vessel"
Assignee: General Electric Company
6. U. S. 2,947,608, August 2, 1960. "Diamond Synthesis"
Assignee: General Electric Company
Foreign Patents and Numbers:

Argentina	122,721
Austria	223,173
Belgium	582,481
Canada	638,043
England	840,770
France	1,243,888
India	68,989
Italy	615,336
Japan	302,022
Luxembourg	37,663
Norway	97,992

7. U. S. 2,947,610, August 2, 1960. "Method of Making Diamonds"
 Assignee: General Electric Company Co-inventors: H.M. Strong, R.H.Wentorf, Jr.
 Foreign Patents and Numbers:
- | | |
|-------------|-----------|
| Argentina | 122,044 |
| Australia | 244,185 |
| Belgium | 582,479 |
| France | 1,243,889 |
| Holland | 105,122 |
| India | 68,990 |
| Israel | 16,118 |
| Italy | 615,335 |
| Luxembourg | 37,645 |
| Switzerland | 365,059 |
8. U. S. 2,944,289, July 12, 1960 "Reaction Vessel"
 Assignee: General Electric Company
9. U. S. 3,158,442, November 24, 1964.
 "Method of Making High Compressive Strength Silicon Carbide and the
 Product Thereof."
 Assignee: Research Corporation
10. U. S. 3,159,876, December 8, 1964. "High Pressure Press"
 Assignee: Research Corporation
11. U. S. 3,182,353, May 11, 1965. "Guide Means for High Pressure Press"
 Assignee: Research Corporation
12. U. S. 3,249,753, May 3, 1966. "High Pressure-High Temperature X-Ray
 Diffraction Apparatus," with J. Dean Barnett.
 Assignee: None
13. U. S. 3,440,687, April 29, 1969. "Multianvil Press"
 Assignee: None
 Foreign Patents and Numbers: South Africa 67/1656
14. U.S. abandoned 13 April 1974, "Diamond Compacts"
 Assignee: Megadiamond Industries
 Foreign patents & numbers:
- | | |
|---------------|-----------|
| Belgium | 748,855 |
| Canada | 1,070,123 |
| France | 2043350 |
| Great Britain | 1,307,713 |
| Ireland | 34,071 |
| Italy | 903,201 |
| Luxemboug | 60,741 |
| South Africa | 70/2043 |
| Sweden | 7005234-5 |
| West Germany | 20 18-344 |

15. U.S. 3,816,085, 11 June 1974, "Diamond-Nondiamond Carbon Polycrystalline Composites"
Assignee: Megadiamond Industries
Foreign Patents & Numbers:
- | | |
|---------------|---------------------|
| Canada | 1033507 |
| Germany | Appl. P 24 20 099.5 |
| Great Britain | Appl. 1.456,314 |
| Japan | Appl. 40837/1974 |
| South Africa | 74/2148 |
16. U.S. 3,829,544 "Method of Making a Unitary Polycrystalline Diamond Composite and Diamond Composite Produced Thereby" 13 August 1974
Assignee; Megadiamond Industries
Foreign Patents & Numbers:
- | | |
|-----------------------------|-----------|
| Belgium | 739.800 |
| Canada | 898,495 |
| France | 2026389 |
| Great Britain | 1,298,565 |
| Republic of
Ireland | 33321 |
| Italy | 872.266 |
| Luxemboug | 59.473 |
| Republic of
South Africa | 69/5840 |
| West Germany | 19 63 057 |
17. U.S.3,913,280 "Polycrystalline Diamond Composites" 21 October 1975
Assignee: Megadiamond Industries
18. U.S. 4,104,344 "High Thermal Conductivity Substrate" 1 August 1978
with Bill J. Pope and M. Duane Horton, co-inventors
Assignee: Brigham Young University
19. U.S. 4,163,769 "High Thermal Conductivity Substrate" 7 August 1979
with Bill J. Pope and M. Duane Horton co-inventors
Asignee: Brigham Young University

Research Grants Received by H. Tracy Hall for the support of his research in the field of High Pressures and Temperatures 1956-74

Carnegie Foundation	1956	\$ 10,000
National Science Foundation	1956	25,500
Office of Ordnance Research (now Army Research Office)	1956	20,000
Linde	1957	300
du Pont	1957	5,000
Office of Ordnance Research (now Army Research Office)	1957	15,000
National Science Foundation	1958	85,000
Office of Ordnance Research (now Army Research Office)	1958	14,590
du Pont	1958	7,500
du Pont	1959	5,000
National Science Foundation (with Dr. Robert Egbert)	1959	10,800
Alfred P. Sloan Foundation	1959	12,000
du Pont	1960	5,000
Army Research Office (with Dr. J. Dean Barnett)	1960	103,100
Diamant Boart	1961	1,500
Alfred P. Sloan Foundation	1961	6,250
Advanced Research Projects Agency	1961	17,700
Alfred P. Sloan Foundation	1961	3,000
Advanced Research Projects Agency	1961	16,000
Army Research Office (with Dr. J. Dean Barnett)	1962	24,372
National Science Foundation	1962	150,000
Army Research Office (with Dr. J. Dean Barnett)	1963	25,530
Army Research Office (with Dr. J. Dean Barnett)	1964	26,730
Army Research Office (with Dr. J. Dean Barnett)	1965	33,936
National Bureau of Standards	1965	28,333
NASA	1965	2,000
Army Research Office (Durham) with Dr. J. Dean Barnett)	1966	33,250
National Science Foundation	1966	25,400
National Science Foundation (with Dr. Myron Best)	1966	27,000
National Bureau of Standards	1967	38,165
National Science Foundation (Chemistry Department for NMR)	1967	31,000
Army Research Office (Durham) with Dr. J. Dean Barnett	1967	7,634
Army Research Office (Durham)	1967	65,095

Atomic Energy Commission (with Dr. J. B. Ott and Dr. J. R. Goates)	1967	\$ 27,072
National Science Foundation (with Dr. J. Dean Barnett)	1967	48,900
National Bureau of Standards	1967	20,000
National Bureau of Standards - Supplement	1968	4,400
National Bureau of Standards	1968	30,000
Army Research Office (Durham)	1969	53,588
National Bureau of Standards	1969	31,800
National Science Foundation (with N. Kent Dalley and J. D. Barnett)	1969	24,000
National Bureau of Standards (Data Center Support)	1970	30,600
National Bureau of Standards (Data Center Support)	1971	30,600
National Science Foundation	1972	30,000
National Bureau of Standards (Data Center Support)	1972	30,600
National Bureau of Standards	1973	30,600
National Science Foundation	1974	31,100
	TOTAL	\$ 1,304,945

LEADERSHIP POSITIONS IN THE CHURCH OF JESUS CHRIST OF LATTER DAY SAINTS

1983- Activities Committee, Ward Choir, Sunday School Teacher.

1981-1983 Misionary together with my wife, Ida-Rose Langford Hall, in the Countries of Zimbabwe (formerly Rhodesia) and South Africa.

1976-1981 Bishop, Pleasant View 1st Ward, Sharon East Stake

1975-1976 Young Adult Sunday School Teacher Pleasant View 1st Wd.

1973-1975 Priest/Explorer Adviser, Pleasant View 1st Ward, Provo

1972-1973 Stake Clerk, BYU 10th Stake, Provo, Utah

1969-1972 High Councilor; Stake Auditor BYU 10th Stake

1967-1969 Explorer Advisor, Pleasant View 1st Ward, Provo, Ut.

1962-1967 2nd Councilor Bishopric, Pleasant View Ward, Provo, Utah

1961-1962 Councilor, Elder's Quorum Presidency, Pleasant View Wd.

1959-1961 Councilor MIA presidency, Pleasant View Ward, Provo, Utah

1956-1960 M-Men advisor, MIA Pleasant View Ward, Provo, Utah

1955-1956 Sunday School Stake Board, Orem Utah Stake

1050-1955 District Councilor, Albany-Hudson District New York Eastern States Mission: also, District Sunday School Superintendent

1948-1950 Sunday School Superintendent, Schenectady, New York Branch, Albany-Hudson District, Eastern St. Mission

1946-1948 In college, active but no leadership positions

1944-1946 In U.S.Navy, active but no church callings

1940-1944 In college, active but no church callings except one year as MIA organist.

1939-1940 Sunday School teacher Ogden 18th Wd, Mt Ogden Stake

1938-1939 Councilor, Elder's Quorum Presidency Ogden 18th Ward

1936-1938 Priesthood Organist, Ogden 18th Ward

1932-1936 Various callings in the Aaronic Priesthood Quorum Presidencies in the Ogden Utah 18th and the Marriott Utah Wards

H. TRACY HALL, resume, continued.

HOBBIES AND OTHER PROFICIENCIES

"Old Time" piano player, leader of the "High Hatter's Dance Band" in Ogden,
Utah 1937-1939

Machinist and mechanic

Electrician

Welder

Maintains a personal machine shop in Provo, Utah where these and related
skills are practiced and maintained in constructing prototypes of inventions

Typist

Bookkeeper

Draftsman

Photographer