TABLE 1

GEOLOGIC FIELD-TRAINING OF NASA ASTRONAUTS BETWEEN JANUARY 1963
AND NOVEMBER 1972

The following is a year-by-year listing of the astronaut geologic field training trips planned and
led by personnel from the U.S. Geological Survey’s Branches of Astrogeology and Surface
Planetary Exploration, in collaboration with the Geology Group at the Manned Spacecraft
Center, Houston, Texas at the request of NASA between January 1963 and November 1972.
Regional geologic experts from the U.S. Geological Survey and other governmental
organizations and universities also played vital roles in these exercises. [The early training
(between 1963 and 1967) involved a rather large contingent of astronauts from NASA groups 1,
2, and 3. For another listing of the astronaut geologic training trips and exercises, including all
attending and the general purpose of the exercise, the reader is referred to the following website
containing a contribution by William Phinney (Phinney, book submitted to NASA/JSC; also

1963

16-18 January 1963: Meteor Crater and San Francisco Volcanic Field near Flagstaff, Arizona
(9 astronauts). Among the nine astronaut trainees in Flagstaff for that initial astronaut
geologic training exercise was Neil Armstrong—who would become the first man to step foot
on the Moon during the historic Apollo 11 mission in July 1969! The other astronauts
present included Frank Borman (Apollo 8), Charles "Pete" Conrad (Apollo 12), James Lovell
(Apollo 8 and the near-tragic Apollo 13), James McDivitt, Elliot See (killed later in a plane
crash), Thomas Stafford (Apollo 10), Edward White (later killed in the tragic Apollo 1 fire at
Cape Canaveral), and John Young (Apollo 16).

1964

4-7 and 11-14 March 1964: Grand Canyon, Arizona (15 astronauts). Scott Carpenter and Alan
Shepard of the Mercury astronauts, Neil Armstrong and Elliot See of the second group, and
the entire third group of 14 astronauts, participated in the first section. The remaining
astronauts—Wally Schirra, Deke Slayton, Gus Grissom and Gordon Cooper, of the Mercury
group; and Ed White, Frank Borman, Jim McDivitt, Jim Lovell, Pete Conrad, John Young,
and Tom Stafford, of the second group—all participated in the second section.

2-3 and 15-16 April, 1964: Marathon Basin and Big Bend Park areas, Texas (16 astronauts).
NASA Astronauts attending the field trip to Big Bend on 2-3 April included: Buzz Aldrin,
Bill Anders, Charlie Bassett, Allan Bean, Frank Borman, Gene Cernan, Walter Chaffee,
Mike Collins, Walt Cunningham, Gordon Cooper, Don Eisle, Ted Freeman, Dick Gordon,
Rusty Schweikart, Dave Scott, Allan Shepard, C.C. Williams, and John Young. Astronauts
participating in the 15-16 April 1964 fieldtrip to Big Bend included: Scott Carpenter, Wally
Schirra, Neil Armstrong, Gordon Conrad, Jim Lovell, Jim McDivitt, Elliot See, Tom
Stafford, and Ed White.
30 April to 3 May 1964 and 20-23 May, 1964
Kitt Peak Observatory, Arizona and flyover of San Francisco Volcanic Field, Flagstaff, Arizona
(all 29 NASA astronauts attended the two sessions)

3-6 June, 1964
Philmont Boy Scout Ranch near Cimarron, New Mexico (20 astronauts)

[Astronauts participating in the training included Buzz Aldrin, Bill Anders, Neil Armstrong, Charles Bassett, Gene Cernan, Roger Chaffee, Mike Collins, Pete Conrad, Gordon Cooper, Walt Cunningham, Don Eisele, Ted Freeman, Dick Gordon, Jim Lovell, Allan Bean, Rusty Schweikart, Dave Scott, Elliot See, Edward White, and C.C.Williams; focus of exercise was on geologic mapping and geophysical instruments traverses]

7-9 and 15-17 October, 1964
Newbury Crater, Bend Oregon (12 astronauts)

[Astronauts attending these two trips to Newbury included: (on 7-9 October) Eugene Cernan, Roger Chaffee, Michael Collins, Rusty Schweikart, and Dave Scott; and (on 15-17 October) Buzz Aldrin, Neil Armstrong, Charles Bassett, Allan Bean, Walt Cunningham, Elliott See, and C.C. Williams

Valles Caldera, New Mexico (16 astronauts)

[Astronauts attending the three separate trips to Valles Caldera include (on 23-25 October- Buzz Aldrin, Bill Anders, Allan Bean, Roger Chaffee, Michael Collins, Ted Freeman, and C.C. Williams; (on 29-31 October 1964) Neil Armstrong, Charles Bassett, Eugene Cernan, Walt Cunningham, Dick Gordon, Dave Scott, and Elliot See. Astronauts attending on 13-14 November were Walt Eisele, and Rusty Schweikart.]

1965

12-14 January 1965: Hawaii (Big Island) (several astronaut groups). Attending this first astronaut trip to Hawaii were astronauts Buzz Aldrin, William Anders, Neil Armstrong, Charles Bassett, Alan Bean, Roger Chaffee, Michael Collins, Charles Conrad, Walt Cunningham, Don Eisele, Dick Gordon, Rusty Schweikart, Dave Scott, Elliot See, and CC. Williams, Jr.


[Author’s Note: Scott Carpenter and Allen Shepard of the Mercury astronauts, Neil Armstrong and Elliot See of the second group, and the entire third group of 14 astronauts, participated in
the first section. The remaining astronauts—Wally Schirra, Deke Slayton, Gus Grissom and Gordon Cooper, of the Mercury group; and Ed White, Frank Borman, Jim McDivitt, Jim Lovell, Pete Conrad, John Young, and Tom Stafford, of the second group—all participated in the second section]


1-3 and 8-10 September 1965: Medicine Lake, California (6 astronauts). Astronauts attending the 1-2 September trip to Medicine Lake included William Anders, Allan Bean and Rusty Schweikart. The 8-10 September trip included Charles Bassett, Walt Cunningham, and C.C. Williams.

14 through 21 September 1965: Zuni Salt Lake, New Mexico (4 astronauts). Astronauts participating in this exercise were William Anders, Allan Bean, Walt Cunningham, and Rusty Schweikart.


27-29 December 1965: Zuni Salt Lake, New Mexico (3 astronauts-make up trip). Astronauts participating included Charles Bassett, Eugene Cernan and Roger Chaffee.

1966


1967


16-17 March 1967: Makeup trip to the Pinacate Volcanic Field Northern Mexico (4 astronauts). Astronauts who participated in this exercise were Joe Engle, Owen Garriott, Joe Kerwin, and Bruce McCandless.

1967


31 May-2 June 1967: Makeup trip to Zuni Salt Lake, New Mexico (4 astronauts). Astronauts participating in this makeup trip to Zuni Salt Lake included John Bull, Joe Engle, Ed Givens, and Bill Pogue.


1968


1969

Started Geologic Field Training Of Assigned Apollo 11-14 Prime and Backup Astronaut Crews

Apollo 11 Crew Training

24 February 1969: Sierra Blanca, Texas (Armstrong, Aldrin, Lovell, Haise)

Apollo 12 Crew Training

Various days from 1 through 14 March 1969: Quitman Mountains (Conrad, Bean)

8-9 April 1969: Kilbourne Hole, New Mexico (Conrad, Bean, Gibson)

1-2 May 1969: Big Bend, Texas (Conrad, Bean, Gibson)

10 July 1969: Meteor Crater, Arizona (Bean)

9-11 August 1969: Hawaii (Big Island) (Conrad, Gibson, Bean, Scott, Irwin, Schmitt)

10 October 1969: Sunset Crater, Arizona (Conrad, Bean, Scott, Irwin, Gibson)
Apollo 13 Crew Training

Late September 1969: Orocopia Mountains, California (Lovell, Haise, Young, Duke, Schmitt)
24 Sept-1 October 1969: Mono Craters, California (Lovell, Haise, Young, Duke)
24 October 1969: Meteor Crater, Arizona (Lovell, Haise, Young, Duke)
11 November 1969: Kilbourne Hole, New Mexico (Lovell, Haise, Young, Duke)
17-20 December 1969: Hawaii, Big Island) (Lovell, Haise, Young, Duke)

Apollo 14 Crew Training

14 August 1969: Flagstaff, Arizona (Shepard, Mitchell, Engle)
22-23 August 1969: Craters of the Moon, Idaho (Shepard, Mitchell, Cernan, Engle)

1970
Geologic Field Training Of Assigned Apollo 13-16 Prime and Backup Astronaut Crews

Apollo 13 Crew Training

15-16 March 1970: SIM to MSC from the USGS’ Black Canyon Crater Field, Verde Valley, Arizona (Lovell, Haise, Young, Duke)

Apollo 14 Crew Training

14-18 February 1970: Pinacate, Mexico (Shepard, Mitchell, Cernan, Engle)
2-4 April 1970: Hawaii (Big Island) (Shepard, Mitchell, Cernan, Engle)
3-4 June 1970: Kilbourne Hole, New Mexico (Shepard, Mitchell, Cernan, Engle)
18-19 June 1970: Flagstaff, Arizona (Roosa, Evans)
11-13 August 1970: Ries Crater, Germany (Shepard, Mitchell, Cernan, Engle)
11 September 1970: Nevada Test Site (Shepard, Mitchell, Cernan, Engle, Evans)
16 November 1970: Cottonwood, Arizona (Branch of Astrogeology's Black Canyon “Crater Field” in Verde Valley, Arizona) (Shepard, Mitchell)

Apollo 15 Crew Training

6-8, 11-12 May 1970: Chocolate Mountains, California (Scott, Irwin, Gordon, Schmitt)
3 June 1970: Orocoa Mountains, California (Scott, Irwin, Gordon, Schmitt)

4-5 June 1970: Flagstaff, Arizona (Scott, Irwin, Gordon, Schmitt)


August 1970: Flagstaff, Arizona Cinder Lake Crater Field (Scott, Irwin, Gordon, Schmitt, Worden, Brand, Allen, Heinze, Parker)

22-23 July 1970: Medicine Hat, Alberta, Canada (Gordon, Brand, Schmitt, Scott, Irwin, Worden)

26-28 August 1970: San Juan Mountains, Colorado (Scott, Irwin, Gordon, Schmitt)

17-18 September 1970: Buell Park, Arizona (Scott, Irwin, Gordon, Schmitt)

7-9 October 1970: Northern Minnesota (Scott, Irwin, Gordon, Schmitt)

2-3 November 1970: Merriam Crater and Cinder Lake Crater Field, Flagstaff, Arizona (first exercise use of Astrogeology's newly completed Grover LRV simulator) (Scott, Irwin; Schmitt, Cernan)

19-20 November 1970: San Gabriel Mountains, California (Scott, Irwin, Gordon, Schmitt)

5-12 December 1970: Hawaii (Big island) (Scott, Irwin, Gordon, Parker, Schmitt, Allen)

Apollo 16 Crew Training

8-10 July 1970: San Juan Mountains, New Mexico (Young, Duke, Haise, Pogue, Carr)

23 July 1970: Medicine Hat, Albert, Canada (Young, Duke, Haise, Pogue, Carr)

1-2 September 1970: Colorado Plateau (Young, Duke, Haise, Pogue, Carr)

12-14 October 1970: Northern Minnesota (Young, Duke)

12-13 November 1970: Nevada test Site, Nevada (Young, Duke)

23-24 November 1970: San Gabriel Mountains, California (Young, Duke)
1971
Geologic Field Training Of Assigned Apollo 15-17 Prime and Backup Astronaut Crews

Apollo 15 Crew

18 January 1971: Kilbourne Hole, New Mexico (Scott, Irwin, Gordon, Schmitt)
10-12 February 1971: Ubehebe Craters, California (Scott, Irwin, Gordon, Schmitt)
11-12 March 1971: Rio Grande Canyon, Taos New Mexico (Scott, Irwin, Gordon, Schmitt)
29-30 April 1971: Coso Hills, California (Scott, Irwin, Worden, Gordon, Schmitt, Brand)
20-21 May 1971: Nevada Test Site, Nevada (Scott, Irwin, Gordon, and Schmitt)
25 June 1971: Coconino Point area north of Flagstaff, Arizona (Scott, Irwin, Gordon, Schmitt)

Apollo 16 Crew

18-20 January 1971: Kilbourne Hole, New Mexico (Young, Duke, Haise)
25-26 February 1971: Flagstaff, Arizona (Young, Duke, Haise)
24-25 May 1971: Capulin Mountains, New Mexico (Young, Duke, Haise)
10-11 June 1971: Mono Craters, California (Young, Duke, Haise)
29-30 June 1971: Flagstaff, AZ (Merriam Crater, USGS’ Cinder Lake Crater Field) (Young, Duke)
7-9 July 1971 (possibly through 14 July): Sudbury, Ontario, Canada (Young, Duke, Haise)
9-10 September 1971: Rio Grande Canyon, Taos, New Mexico (Young, Duke, Haise, Mitchell)
27 October 1971: Nevada Test Site (Young, Duke, Haise, Mattingly)
17-18 Nov. 1971: Coso Hills, California (Young, Duke, Haise, Mitchell)
7-13 December 1971: Hawaii (Big Island) (Young, Duke, Haise, Mitchell)
Orbital Geology Training (fly-around and field exercises) for the Apollo 16 prime and backup CMP pilots during 1971

5-6 May, 1971: S.F. Volcanic Field, North-Central, Arizona

23-25 June 1971: Craters of the Moon, Butte Crater (rille), Idaho, landslides and mud flows (in Idaho), and Pleistocene lake terraces, Salt Lake, and structure in the Wasatch Mountains (in Utah)

19-21 July, 1971: (a) Pinacate Volcanic Field (Sonora, Mexico) and New Mexico; (b) Descartes landing site geology with Apollo 14; (c) Meteor Crater and the Hopi Buttes, Arizona

7-8 September, 1971: Rio Grande Valley, Taos, New Mexico and Valles Caldera, New Mexico

13-15 October, 1971: Northern California, Southern Oregon (Mt., Lassen, Medicine Lake Highlands and Crater Lake Caldera)

27-28 October, 1971: Nevada Test Site, Mercury, Nevada (with entire crew)

Apollo 17 Crew Training

19-22 October 1971: Big Bend, Texas (Cernan, Schmitt)

17-18 Nov. 1971: Flagstaff, Arizona (Evans)

18 November 1971: Coso Hills, California (Cernan, Schmitt)

20-21 Dec. 1971: Kilbourne Hole, New Mexico (Cernan, Schmitt)

1972
Geologic Field Training Of Assigned Apollo 16 And 17 Prime and Backup Astronaut Crews

Apollo 16 Crew Training

17-18 February 1972: McCullough Mountains west of Boulder City, Nevada (Young, Duke, Haise, Mitchell)

Apollo 17 Crew Training

24-25 January 1972: McCullough Mountains west of Boulder City Nevada (Cernan, Schmitt, Evans)

22-25 February 1972: Chocolate Mountains, Mojave Desert, California (Cernan, Schmitt, Scott, Irwin)
23-24 February 1972: Flagstaff, Arizona (Evans)

14-15 March 1972: Sierra Madera (Cernan, Schmitt)

16-17 March 1972: Nevada Test Site (Young, Duke)

10-12 April 1972: San Gabriel Mountains, California (Cernan, Schmitt, Scott)

24-25 May 1972: Sudbury Crater, Ontario, Canada (Cernan, Schmitt, Evans)

22-29 June 1972: Hawaii (Big Island) (Cernan, Schmitt, Evans)

24-25 July 1972: Stillwater, Montana (Cernan, Schmitt, Evans, Young)

7-8 August 1972: Nevada Test Site (Cernan, Schmitt, Young, Duke, Roosa)

6-7 September 1972: Tonopah, Nevada-Lunar Crater (Cernan, Schmitt, Young, Duke)

6 October 1972: Blackhawk Slide (north of the San Bernardino Mountains and the Mojave Desert, California (Cernan, Schmitt, Young, Duke)

2-3 November 1972: Sunset Crater and the Cinder Lake Crater Field near Flagstaff, Arizona (Cernan, Schmitt, Young, Duke)