

Lechuguilla Cave Expedition Report

Far West Expedition

May 5-12, 2012

Summary

This report summarizes the results of a ten-person expedition to the western branch of Lechuguilla Cave. The expedition was planned and led by Derek Bristol. All objectives were in the Far West portion of the cave and included new survey, re-sketching, and blunder correction in the Promised Land (H34), Zanzibar (H35), Rainbow Room (I34) and Keel Hall (I35) quadrangles. Additionally, a climbing team completed the ascent of Kansas Twister dome in Emerald City and discovered an extensive new area of the cave at an elevation well above any other known passage outside the entrance zone. The results of the expedition included 7,006.9' of total survey; 6,654.2' of new survey and 352.7' of excluded survey. Additionally, detailed plan sketches of Keel Hall and Rainbow Room were drawn, as well as profile views of Long Haul, Keel Hall, Oasis and Huapache Highway. The expedition added 1.26 miles to the length of Lechuguilla Cave and corrected a number of errors and omissions in older survey data and sketch notes.

Expedition Goals and Accomplishments

Each goal from the expedition proposal is in italics. A summary of the results follows.

PRIMARY GOALS:

1. *Survey remaining leads in Billiard Parlor, Eden and Nativity Chamber (N34, N130-147, N24K, NB4), and resolve sketch problems with NA9 boneyard maze. **Completed***

Leads at N34 and one of the leads at N24K were not leads and have been removed from the map. The other leads at N24K and at NB4 are internal, have very low potential, and are extremely delicate. These have been marked as "too delicate" on the map and will not be pursued. Leads in the N130-147 boneyard area were fully surveyed. The sketch confusion in the NA9 boneyard was resolved by careful study of the lineplot and profile view sketches and the finished map has been updated. The entire Promised Land area can now be considered "complete". There are no remaining leads and the cartography is fully updated.

2. *Survey leads in the west half of Zanzibar and Zombie Zoo (IBHB, IBHC, IX, IBD74 and IBK24). **Completed***

The leads off of IBHB were determined to be too tight. All of the leads under the SW end of Zanzibar along the IBHC survey were fully surveyed. The two small leads along the IX survey have very low potential and are extremely delicate due to many large aragonite bushes. It was determined that these leads can not be entered without causing damage so they have been marked on the map as "too delicate" and will not be pursued. There was no lead found at IBD74, but unmarked leads were surveyed nearby and the area has been completed. The area near IBK24 was fully surveyed with only a little passage found going around large breakdown slabs. Finally, the far western end of IHOP, which was previously marked as "too tight" was pushed a little further by a small team into a small extension named the "Iron Maiden", but all leads were exhausted. All leads in the breakdown area under Zanzibar (IBD47 and IBD54) were surveyed. There are no remaining leads in the Christmas in August or Zanzibar areas and the maps are fully updated so these areas can now be considered "complete".

3. *Correct sole remaining loop error in Keel Hall quad. **Completed***

A bad loop was closed in Northern Exposure during the 2011 Far West expedition. Analysis of the loop suggested the problem was a length error in one of the N-S shots. The blunder was quickly found in the IBD17-18 shot (made during the original survey in 1999), and corrected. This eliminates the last bad loop (>2 s.d.) and known blunder in the entire H34, H35, I34, I35 quad area.

4. *Survey remaining leads in Birthday Present and Northern Exposure (IBD, IBDJ, IBH, IBJ). **Partially Completed***

The lead at IBJ18 was found to be an alcove and was removed from the map. A very tight breakdown passage heads up near here but would require a very small team to enter. The lead at IBH1 was located and surveyed to completion and the “too tight” termination at IBH13 was inspected and found to not be worth the effort to dig open. A small number of leads remain in the IBD, IBDA and IBHA surveys in the southern end of Northern Exposure and these can be easily completed during the next expedition to the area.

5. *Re-sketch all of Keel Hall and Rainbow Room. Re-survey steep fissure complex above Rainbow Room. **Completed***

Sketches were made of both the Rainbow Room and Keel Hall. Both these areas were originally surveyed and sketched in 1988 and they lacked both accuracy and detail. The steep fissure above Rainbow Room was not resketched, but its relationship to Rainbow Room was clarified and it was determined that a re-sketch was not needed.

6. *Complete Kansas Twister aid climb to two excellent leads in Emerald City. **Completed***

This phreatic dome was successfully climbed and surveyed. Several side passages at various elevations were surveyed and a new large area named Oz was discovered near the top of the 410' dome.

7. *Climb and survey vertical leads in Long Haul and Keel Hall (IBA6A, IBA4, IBN1, IO14). **Not Completed***

The Kansas Twister climb was more than twice as high as anticipated and took 5 days to complete. The discoveries made at the top of this climb took priority over these other climbing leads, so they were not attempted.

8. *Survey leads near the Sanctuary (EMG, EMH, EMGF, EMGG, EMHU). **Partially Completed***

A couple of leads on the north (EMGH9) and south (EMG29) ends of Sanctuary were surveyed. There is a lot more work to be done in the Sanctuary area before it can be considered complete. A couple of days of mop-up survey would be a good starting point. The area has a lot of verticality and is positioned along the edge of the known cave, so it should be thoroughly checked.

9. *Survey leads in lower levels of Mirage Room (IFF, IFD and IN surveys). **Partially Completed***

Virtually all of the leads in the lower level boneyard under Mirage Room (IN and IFD surveys) have been completed. It was found that a handline is needed to reach the lead in the IFF survey, but further review of the notes suggest it may connect back into Mirage Room.

SECONDARY GOALS:

1. *Make progress in mopping up additional leads in Paris, TX boneyard maze. **Not Completed***

Lack of time and other priorities prevented working in Paris Texas.

2. *Scout and possibly climb vertical leads near Sanctuary and Brown Plate Room. **Partially Completed***

The climbing lead at EMHU18 was found to have been climbed already, but it was not surveyed. The lead at EMGH27 was not located.

3. *Survey leads above Mirage Room in IM and IH surveys. Close loop between IH10 and IM14. **Not Completed***

Time did not allow a visit to this area.

OTHER ACCOMPLISHMENTS:

Several other survey and exploration activities took place during the week in the areas of study.

1. Pre-printed profile view line plots of some of the more significant passages in the Far West were brought. Profile view sketches of Rainbow Room, Long Haul, Keel Hall, Oasis and Huapache Highway were made. These have been incorporated into the final map.
2. Several side passages and a large borehole were found via the Kansas Twister dome climb. Over 4,000' of new survey was completed here with many high quality leads remaining to be explored and surveyed on future expeditions.
3. Samples of ferro-manganese deposits (FMDs) of various colors were collected in the Rainbow Room for Dr. Diana Northup.

Team

A number of original team members had scheduling conflicts that required using all of the alternates, and then within a few weeks of the expedition a couple folks had to drop out due to health concerns or work conflicts. Skilled and experienced replacements were found on short notice resulting in a full team of 10 cavers. Team members included Derek Bristol (CO, expedition leader, sketcher, climber), James Hunter (NM, sketcher, climber), Jennifer Foote (NM), Brian Kendrick (NM, sketcher), John Lyles (NM), David Lambert (CO, sketcher), Roger Harris (CO), Abby Tobin (AZ, sketcher), Shawn Thomas (CA, sketcher), and Adam Weaver (SD). Eight of the team members had previous experience in Lechuguilla Cave, while it was the first trip for David Lambert and Roger Harris. Both of these cavers are physically strong, skilled in rope work, experienced surveyors and caved softly and safely. They both were continuously optimistic, enthusiastic, and willing to sacrifice for the good of the team. Both will be strong contributors to future expeditions. This was the second camp trip for both Adam Weaver and Derek Bristol. The team worked extremely well together and accomplished a significant amount of work given the diminishing quality of leads and the distance traveled each day to reach

objectives. The survey total is one of the highest for a Lechuguilla expedition in some time and this was with a nearly full-time climbing team, blunder correction efforts, science sample collection, and a significant amount of re-sketching.

Detailed Daily Reports

5-5-2012 (Entering the Cave) – trip leaders underlined

Derek, Roger, Jen and Dave (team 1) rigged the entrance and entered the cave at 14:00. The replacement dead-bolt on the outer airlock door worked very smoothly. Short rests were taken at the bottom of Boulder Falls and EF Junction. All ropes and anchors appeared to be in good condition, although a small amount of mold growth was evident on the newly installed rope at the bottom of Great White Way. The team arrived in camp at 17:45 (3:45 travel time). John, Adam and James (team 2) entered the cave at 14:20 and made it to camp by 16:40 (2:20 travel time). Right behind them was Shawn, Abby and Brian (team 3) who entered the air-lock at 14:30 and made it to camp by 17:45 (3:15 travel time). There were no incidents or issues with any of the teams. There was virtually no airflow at the air-lock (neutral pressure). Trips were made to Lake Louise to fill larger water containers that were used throughout the week. The team was in bed by 22:00.



Dave Lambert at the Entrance

5-6-2012 (Promised Land, Zanzibar and Kansas Twister)

Derek, James and Roger left for Kansas Twister in Emerald City at 7:50. They received some help from other teams carrying climbing gear to Leaning Tower, but then had to carry all of this gear the remaining distance to the base of the dome. Derek went up the fixed rope to the lower natural bridge, while being belayed by Roger. Several attempts were made to get a line over the upper natural bridge using a slingshot and fishing reel belonging to John. On several shots the steel nut went up past the upper bridge, but on each occasion it landed on a ledge above and would not fall down the far side of the bridge. After breaking the line several times, and losing the last available nut, the technical climb was begun. The ledge to the left of the bridge (when facing south) looked steep and insecure and the lead didn't look promising. The first 10' of the main climb appeared to be low angle and free-climbable, but the rock was extremely fractured. Much of this loose rock was cleaned away, but more loose and fractured rock was found underneath. A removable bolt (RB) was placed about 10' above the bridge before the lead was changed. James led the next 20' through the worst



Derek starts the first lead in Kansas Twister

quality rock. A 3/8" bolt was placed next to the RB and then several cam placements were found by cleaning away the loose surface rock. At the end of this pitch another 3/8" bolt was placed before the lead was changed again. Derek led the next 20' up steeper but generally better quality rock. One 1/4" bolt was placed and a bat hook used before a final 3/8" bolt was placed prior to changing leads again. At this point the angle lessened and the next 30' appeared to be free-climbable, but rope drag was becoming a problem. Derek retreated to the lower natural bridge and James came up and took the final lead of the day. Derek belayed from the bridge to limit rope drag while James headed up and right to a ledge and alcove on the west side of the dome. A 3/8" bolt was placed at this alcove and equalized to a natural anchor. The team retreated to the ground and left for camp, arriving at 22:20. No survey was conducted.

John, Brian and Adam left for Zanzibar at 8:00. They surveyed a short side passage on the south side of Zanzibar tying in at IBD45 and using stations IBD45E-H. They then proceeded to the far western end of IHOP (International House of Pain) where they pushed through a previously marked too-tight passage at IBD136, beyond the western extent of known passage in this area. The crawls beyond quickly became too tight and they surveyed back out to IBD136 using IBD95A-J. This area was named "Iron Maiden" due to the tortuous passage. They then scouted the rest of Zombie Zoo and found no new or remaining leads. A short cut-around was surveyed from IBD68 using IBD68A-D. A side passage at IBD65 was surveyed until two branches both became too tight using IBD65A-J. A lead at IBD74 was found to be too tight and will be removed from the map and lead list. The two tight leads at IX12 are blocked by large aragonite bushes and entering them would cause impact. They are internal and of low potential so they will be designated "too delicate". There are no remaining leads in IHOP or Zombie Zoo and these areas can now be considered complete. The team returned to camp at 22:30. A total of 254.1' of new and 9.1' of excluded survey was accomplished.

Jen, Shawn, Dave and Abby left camp at 8:30 and traveled to Promised Land, where they changed into clean gear to cross Nativity Chamber, Apple Orchard and Eden. They found that the lead indicated at N34 was just an alcove so they moved on to the boneyard leads in the Billiard Parlor. They surveyed the leads at N130, N147 and N148 using N153-158. They proceeded to the leads in Eden at N24K. The tight lead on the right was found to be an alcove and the lead on the left could not be done without causing significant impact. This lead is internal and has very poor potential so it will be marked as "too delicate". A lead in Nativity Chamber at NB4 is also internal with low potential and climbing into it would result in FMD being knocked down onto flowstone, so this will also be marked as "too delicate". The team returned to camp at 21:30. A total of 66.1' of new survey was accomplished. There are no more leads in Promised Land, and the sketch quality is good, so this area can be considered complete.

5-7-2012 (Mirage Room and Kansas Twister)

Derek, James, Brian and Shawn left camp at 9:20 and traveled to Emerald City. Derek, James and Shawn ascended the fixed rope to the high point along the west wall. Brian ascended to a rebelay bolt approximately 30' below the upper natural bridge. A 4mm tag line was tossed from the upper anchor over the natural bridge where Brian caught it and pulled an 11mm static rope over the bridge and secured it to the rebelay anchor. Derek ascended this fixed rope and climbed on top of the upper bridge. From here he free climbed west then back east using a series of ledges to gain elevation. A bolt was placed in an alcove at the east end of a FMD coated ledge and used as an anchor for a tension traverse further east to a free-climbable slope. At the base of the slope was a horizontal lead on the north side of the dome, and at the top of the slope was a breakdown floored alcove. A large boulder was used to establish an anchor in this alcove. A small room was accessed from the east end of this alcove and James free-climbed up into a steep tube that led back west and intersected the main dome and allowed a bypass of ~30' of

overhanging aid climbing. A natural anchor was established here and Brian and Shawn began to survey back down to the lower natural bridge using the EKT survey designation. Derek and James de-rigged all previous ropes and anchors, set two new bolts at a ledge next to the lower horizontal lead, and re-rigged the 200' x 11mm static rope from here to the base of the dome with 2 rebelay loops. The rope is a bit short so the rebelay loops had to be made very short. It is recommended that when this rope is eventually replaced that a 220' length be substituted. Also, although the top anchor for this rope is a Fixe double-wedge in good rock, and backed up by another rope above, a second bolt should be placed for redundancy. Brian and Shawn completed 300.1' of new survey using EKT1-12 and tied into EVJC2 on top of the lower natural bridge. The team returned to camp at 22:45.



Derek climbs the fixed rope to the top of the upper natural bridge in Kansas Twister

Abby, Roger and Adam left camp at 9:30 and traveled to the Mirage Room where they surveyed several leads off of IN23 and later IN17 and 18. They completed all the eastern boneyard leads under Mirage Room and spent 30 minutes scouting for leads along the walls of the room, but none were found. They used stations IFD37-58 and completed 333.0' of new and 21.4' of excluded survey. The team returned to camp by 19:50.

Dave, Jen and John left camp at 9:40 and also traveled to the Mirage Room. They surveyed leads in the lower level boneyard complex and along the SW wall of the Mirage Room using stations IN25-39. A leather glove was lost somewhere near IN24. They were able to complete all the remaining leads along the western edge of this area. They returned to camp by 20:05. A total of 175.0' of new and 16.7' of excluded survey was completed.

5-8-2012 (Long Haul, Zanzibar and Kansas Twister)

Derek, James, John and Abby left camp at 10:00 and traveled to the Kansas Twister climb. The entire group ascended the 200' fixed rope to a large ledge with a north trending horizontal lead off of EKT10. John and Abby surveyed to a T junction and surveyed both sides of this east-west trending passage. The west branch was surveyed downward to a low flat room choked with large spar with air. A steep fissure lead was also found. This goes up at least 35' and continues but will require strong free-climbers to safely climb. Technical gear may not be needed but a handline will need to be rigged for those that follow, and the climb is very muddy so clean gear may be needed to prevent tracking mud onto the white popcorn lined passage that accesses the climb. The east branch had some small shallow pools and flowstone lined with FMD. This didn't go very far before coming to a FMD lined tube trending down. Going into this tube will result in getting very dirty and then tracking this dirt back onto flowstone. Clean clothes and resto gear may be needed to minimize impact. Stations EKT13-26 were used. John and Abby

continued up the other side of Kansas Twister to EKT5 where John crawled into a constriction and found a way through gypsum breakdown to a nice chamber. EKT27 was set and tied into EKT4 below. Meanwhile, James started the next lead up the east branch of Kansas Twister. He aid climbed over a short roof above EKT1 to a lower angle sediment covered slope that was easily free-climbed. At the top of this slope the walls became steeper and he climbed a short distance up a vertical wall to a natural anchor and set a bolt for backup. Derek then led the next 35' over two small roofs using a mix of aid and free climbing techniques. One bolt was placed after the first roof, and a hook was used to cross the second roof. This led to the top of the east branch of the KT dome where horizontal passage led west and a ledge led back east across the top of the pit to a breakdown passage. The horizontal passage to the west intersected the west branch of the KT dome, which went both up and down. The climb up appeared to continue for at least 60' and there were no obvious features for placing climbing gear. Two bolts were placed at the top of the east branch of the KT dome and the 180' x 11mm rope brought from camp was rigged from here back down to the breakdown alcove at EKT9. After going over the rounded lip this is a nearly free 130' rope pitch. The team regrouped at the breakdown alcove and left for camp, arriving by 22:15.

Brian, Roger and Shawn left camp at 10:25 and traveled to Zanzibar. At the west end of the room, a lead in breakdown at IBD57 was surveyed to the east until it became too tight in aragonite, and then they surveyed back west, crossing the IBHC survey in breakdown until that also ended. Stations IBD140-157 were added. They finished all the leads under the SW edge of Zanzibar. They then mopped-up leads off of IBD54E in the breakdown passage under the middle of Zanzibar using stations IBD54M-T. They left for camp and arrived by 21:30. 398.1' of new survey was completed.



Shawn, Roger and Brian with aragonite bushes in Zanzibar (near station IBD149)

Jen, Dave and Adam left camp at 11:00 and traveled to Long Haul. They surveyed leads in Velvet Underground, beneath the east end of Long Haul. Leads off of IBGA5, IBGA7 and IBAC3 were surveyed using stations IBGA18-27. Several leads near IBGA11-15 were not surveyed because of concerns over causing impact to aragonite bushes in the area. To access these leads would require full clean gear and impact may still result. These leads are directly under Keel Hall with low potential so they will be marked as “too delicate”. The remaining leads in the IBB survey were not pushed because they were remembered as being very tight, but they will be left on the lead list for now. A north trending lead near IBB7 could not be located. They then went to Northern Exposure to locate an apparent blunder in a small loop. They quickly found the problem in the IBD17-18 shot. The length was originally recorded as 27.0', but was actually 21.9'. This reduces the loop error to <1s.d. They left for camp and arrived by 20:00. 151.1' of new survey was completed.

5-9-2012 (Northern Exposure, Rainbow Room and Kansas Twister)

John, Brian and Roger left camp at 10:00 and traveled to Northern Exposure. A lead indicated in the notes at IBD47G did not exist. The undefined area east of IBK24 where the walls did not connect is an area around a large breakdown block. This was surveyed with IBK33-34. They then went to Birthday Present and checked the east trending IBH passage, which an earlier party had described as having airflow and a termination that might be easily dug open. They found the restriction at the end appeared to lead into a very small chamber but then became too tight again. They determined that opening this restriction was not worth the effort. A lead trending down at IBH1 was surveyed using IBH14-18 to its end. On the south side of Teardrop Basin they went into the IBJ survey to check a lead, but found the passage to be very difficult and tight. One team member went ahead and found the lead at IBJ18 to be a 6' alcove. An unreported lead appeared to go up at IBJ19 into a larger breakdown chamber (~20' diameter), but they saved this survey for another day with a small team. They returned to camp, arriving by 21:00. 101.2' of new survey was completed.

Shawn and Abby traveled to Keel Hall with John's team where they split up and went to the Rainbow Room. Although this was a team of two, the work they had planned didn't require a third and these two teams stayed within 30 minutes travel of each other. At the Rainbow Room they began a resketch of IBA12-30 using a pre-printed line plot of the area. The new sketch varied significantly from the original made in 1988. They verified the location of the steep fissures leading out of the room that follow the IBAA and IBC surveys, but did not sketch these difficult passages. They then went about collecting three FMD samples for Dr. Diana Northup. There were reportedly three different colors of FMD, thus giving the room its name, but they found it difficult to clearly classify deposits as having distinctively different colors. Samples of what could be described as dark brown, brown/tan and pinkish-red were carefully collected in collection vials and packaged for transport. A profile sketch of the Rainbow Room and Long Haul was made using pre-printed line plots. They returned to camp, arriving at 20:00.

Derek, James, Jen, Dave and Adam left for the Kansas Twister climb at 10:10. The team ascended the first two ropes to the breakdown alcove together. Jen, Dave and Adam began surveying the gypsum breakdown and rock flour filled room east of EKT27 while Derek and James continued up the next fixed rope. The survey team used stations EKT28-46 to map a complex vertical breakdown area with gypsum flowers and needles. Two leads were left that would require climbing up very unstable breakdown. These may be too dangerous and not worth the risk to pursue. Meanwhile, James led a horizontal traverse across the top of the east branch of the KT dome to a breakdown lead on the far side. This ledge was crossed quickly on lead and the small room on the far side was explored. A lot of very loose breakdown was found, but no continuation, so James climbed back across the ledge and removed all protection. Derek led the next vertical pitch of the west branch of the KT dome up very poor quality rock. The nut tool proved useful in probing the surface of the rock to find clay filled pockets that were cleaned out to create cam placements. A couple of these failed during bounce tests when the rock crumbled so new placements had to be found. At least 5 hook placements were used on this short pitch. A sharp-edged breakdown block was crossed, which led to a large ledge and alcove with a natural bridge anchor. A 3/8" bolt was placed out away from the breakdown block to act as a rebelay to avoid the potential for rope damage. Crawling leads extend east from this alcove, but they did not appear to have great potential and the main dome, although getting smaller, continued to go up and to the west. This pitch was rigged with a 100' x 9mm static rope that had been brought from camp. Jen and Adam came up to the top of the east branch of KT to see the climb, and then the entire party descended together. They left for camp, returning by 23:25. 204.4' of new survey was completed.

5-10-2012 (Sanctuary, Keel Hall and Kansas Twister)

Derek, James, Brian and Roger left camp at 10:45 and headed to Kansas Twister. They ascended the first two ropes together and Derek and James continued up the third and fourth ropes to the top of the technical climb. Brian and Roger continued the survey of east branch of the KT dome by tying into EKT1. This section was surveyed while hanging on rope using some creative station setting. They surveyed upwards following the climbing team and caught up just as the climb was completed. James led the final 35' section of the west branch of the KT dome over poor quality rock using fabricated cam placements and one knifeblade piton. The rope was rigged to a large natural bridge at the top of the dome. A small upward trending passage headed



James and Derek during the discovery of Oz

off to the west, but will require some additional technical climbing to reach. Several crawling leads led off near the top of the climb and a small talus filled room was found. Once the top of the pitch was rigged Derek and James helped Brian and Roger finish the survey of the dome and then they all continued to survey up into the talus room. From here they surveyed a 15' high room to the west, but the main trend ended quickly in breakdown. A couple leads continue from near this termination, but both of these lead back down. Back in the talus room a 1'x3' hole at the top of the talus slope was surveyed. This talus crawlway was named the Curtain. After just a couple shots the team came out into a large room where the ceiling was barely visible. Several attempts were made to measure the ceiling height before a reading of 232' was registered. It was getting late so the team packed up and headed back to camp, arriving by 00:25 (5/11/12). 476.8' of new survey was completed using stations EKT47-66.

Shawn, Jen and Abby left camp at 10:45 and traveled to Keel Hall. They went to the NW side of the room and began a detailed plan view re-sketch of the room. This room was originally drawn in 1988 and lacked detail and accuracy. A pre-printed line plot of the survey was used as a framework for the sketch. The team sketched from IB11 back to IB2 before suspending the effort. They then went to the Oasis where they changed into clean gear, took some photos, and began a profile view sketch of Oasis and Huapache Highway from EY103 to EY92 using pre-printed line plots. When this was complete they headed for camp, arriving by 21:15.

John, Dave and Adam left camp at 11:05 and traveled to Sanctuary. They went to scout potential climbing leads at EMHU15 and EMGH27. They did not go to the top of Topless Room, but John

found in old trip reports that the lead at EMHU15 was probably already climbed, but not surveyed. They were unable to locate the area with the lead at EMGH27, but did survey a short lead off of EMGH9 using EMGH9A-E. Back on the south side of Sanctuary they surveyed a lead starting at EMG29 that crossed over the entrance climb to tie into EMGG17 using stations EMGL1-7. They also scouted the leads east of EMG47 and determined that they were too tight. These will be removed from the lead list. A few other lead tapes were observed on the way back to camp but not surveyed. At EMG13 in Menagerie is a steep pancake fissure above the station that is 1.5-2' high and looks interesting. A lead going down into breakdown at EMG2 at the beginning of the Menagerie did not look promising. A lead flag at EYC7 near the Western Borehole goes up into a huge pancake fissure above. They returned to camp, arriving by 22:50. 249.6' of new and 6.6' of excluded survey was accomplished.

5-11-2012 (Keel Hall and Oz)

Derek, James, John and Adam left camp at 10:00 and traveled to the new discovery that is now called Oz, following the theme started below in Emerald City. They surveyed up the main breakdown collapse slope leaving a good lead heading east near where the Curtain crawl enters. A very steep slope at the top of the breakdown hill was rigged with some spare webbing. At the top of the slope is a flowstone and stalagmite area directly below a high dome in the ceiling. Another area with flowstone and stalagmites is found slightly to the SW and directly below another ceiling dome. This ceiling dome contains columns and large draperies. This was named the Wizard and may have a lead that is up and out of sight, but would require technical climbing up an overhanging wall to reach. Several passages to the west turned out to be alcoves, but one



Derek and Adam surveying in Munchkinland

climbing lead remains. James pioneered an exposed traverse back to the east on the south side of the large breakdown collapse along a steep rock flour covered slope. This was named the Cowardly Lion Traverse and the far end has a steep climb that was rigged with a 20' piece of webbing. Large borehole passage trending NE was surveyed with several high-level leads heading off that will require technical climbing to reach. This borehole was named

Munchkinland because it made us all feel very small. After approximately 700' in Munchkinland, which averages 124' wide and 104' high, the passage splits and the breakdown-filled borehole quickly transitioned into a phreatic tube. This passage alternated between deep rock flour, gypsum, and FMD on the floor. A large side lead heading south was marked and later surveyed by the other team. After surveying a few stations to the NE, a large formation area was encountered. A 15' soda straw hangs from a ceiling ledge and there are draperies, columns, lily pads, large stalagmites, and many other speleothems. There are also a couple of shallow pools

and large leads heading north. Reaching these leads will require aqua socks at a minimum and probably full clean gear. The main passage turns to the SE and was surveyed for another 15 stations until we ran out of survey pages, food, water, batteries and flagging tape. Several side leads head off in this area and the final station was set in passage that is 107' wide x 20' high. The team departed for camp, arriving by 03:50 (5/12/12). Stations EKT67-102 were used to complete 2,729.1' of new and 297.1' of excluded survey. This is the most survey conducted by a team in a single day since 1989.

Jen, Dave and Roger left camp at 10:15 and traveled to Keel Hall. They completed the plan view resketch of Keel Hall started on the previous day, and sketched a profile view of the room using pre-printed line plots. They returned to camp, arriving by 21:30.

Shawn, Abby and Brian waited to give the other Oz team time to get up Kansas Twister and departed camp at 11:30. They joined the first Oz team at the top of the breakdown and surveyed a cut-around along the south wall before heading back down the breakdown collapse to survey the side passage at EKT67. Right away they encountered a 40' pit that required care to traverse around. This traverse was named Dorothys Fence. This traverse and the pit will need to be rigged in the future. They continued surveying east in passage containing gypsum beards, needles and green minerals. After 11 stations they came to a termination where passage went up and down, but will require rope to continue. The pit was measured to be 110' deep and the dome



Formation area in Oz

is 65' high. This feature was named the Wizards Elevator. A free climb was made up a blind dome off of EOZ9 and surveyed. They then returned to Munchkinland and followed the other team until meeting up at the newly discovered formation area at EKT87. After taking some photos they started surveying the walking lead at EKT83. This area was large boneyard with many walking sized leads. They surveyed until reaching a termination at another

large dome/pit with the dome measured at 85' and the pit measured at 160'. The team had some interesting observations on airflow in the area. Below are quotes from team leader Shawn Thomas: "we seemed to be instinctively following airflow which was growing stronger and stronger. We continually commented on how "fresh" the air felt, as it was noticeably cooler and less humid than the air that we usually associate with Lechuguilla."; "More intriguing, though, was the downdraft of cool air that seemed to be pouring out of the high fissure. This air current was so prominent that it was possible to extend an arm in and out of a "blade" of heavy, cold air dropping down from the relatively narrow fissure above. The air felt so fresh that our team agreed that we felt as if we were on the surface as opposed to being underground. It is worth

noting that the next day, as we exited the cave, we experienced nearly exactly the same “fresh air” feeling as we approached the airlock, and the cave was breathing in. This experience bolstered our team’s feeling that we had discovered a surface connection in the fissure above station EOZ22, whether it be a complex of minute cracks or a more significant blowhole.” They returned to camp, arriving by 03:00 (5/12/12). Using stations EOZ1-22 they surveyed 855.6’ of new passage and left many large leads.

5-12-2012 (Exiting the Cave)

John, James and Jen left camp at 10:30 and exited the cave at 14:00 (3:30 travel time). Shawn, Abby and Adam left camp at 11:00 and exited the cave at 14:20 (3:20 travel time). Derek, Roger, Brian and Dave left camp at 11:45 and exited the cave at 16:05 (4:20 travel time). There were no incidents or issues.

Conservation

- A glove was lost somewhere near IN24 in the Mirage Room.
- One group traveled to Promised Land to mop-up a few remaining leads and they used clean gear to access the area. There were no incidents to report and the area continues to look pristine.
- One team spent a short portion of one day sketching a profile of Oasis and used clean gear to visit the Oasis Pool Room. There were no incidents.
- Approximately 8 wedge bolts were used for progress on the Kansas Twister climb and then later de-rigged (hangers and nuts removed). These bolts no longer serve a purpose, but can not be easily removed. They are stainless steel and will not corrode significantly. It is recommended they be left in place.
- Some webbing belonging to various team members was used for natural anchors on Kansas Twister. Some of this is yellow, black, green or other colors other than white. This should be replaced with the standard white 1” tubular webbing to reduce the potential for staining.
- All of the trail flagging that was brought into the cave was used – primarily in Oz. The route in Oz will need to be flagged more clearly and eventually a solid, double-flagged trail may be necessary. There is also a need to improve the trail flagging through some parts of Emerald City to keep the trail from getting wider.
- One team member carried all of their pee out of the cave. As was their experience on a previous expedition this amounted to approximately 7.5 liters (~16 lbs). They were able to do this while still carrying a share of group gear (survey gear, stove and fuel, water container) and 10 lbs of climbing gear, while keeping total pack weight to approximately 47 lbs. This may be too heavy for some cavers, and is only possible through the use of other ultra lightweight gear and careful packing.

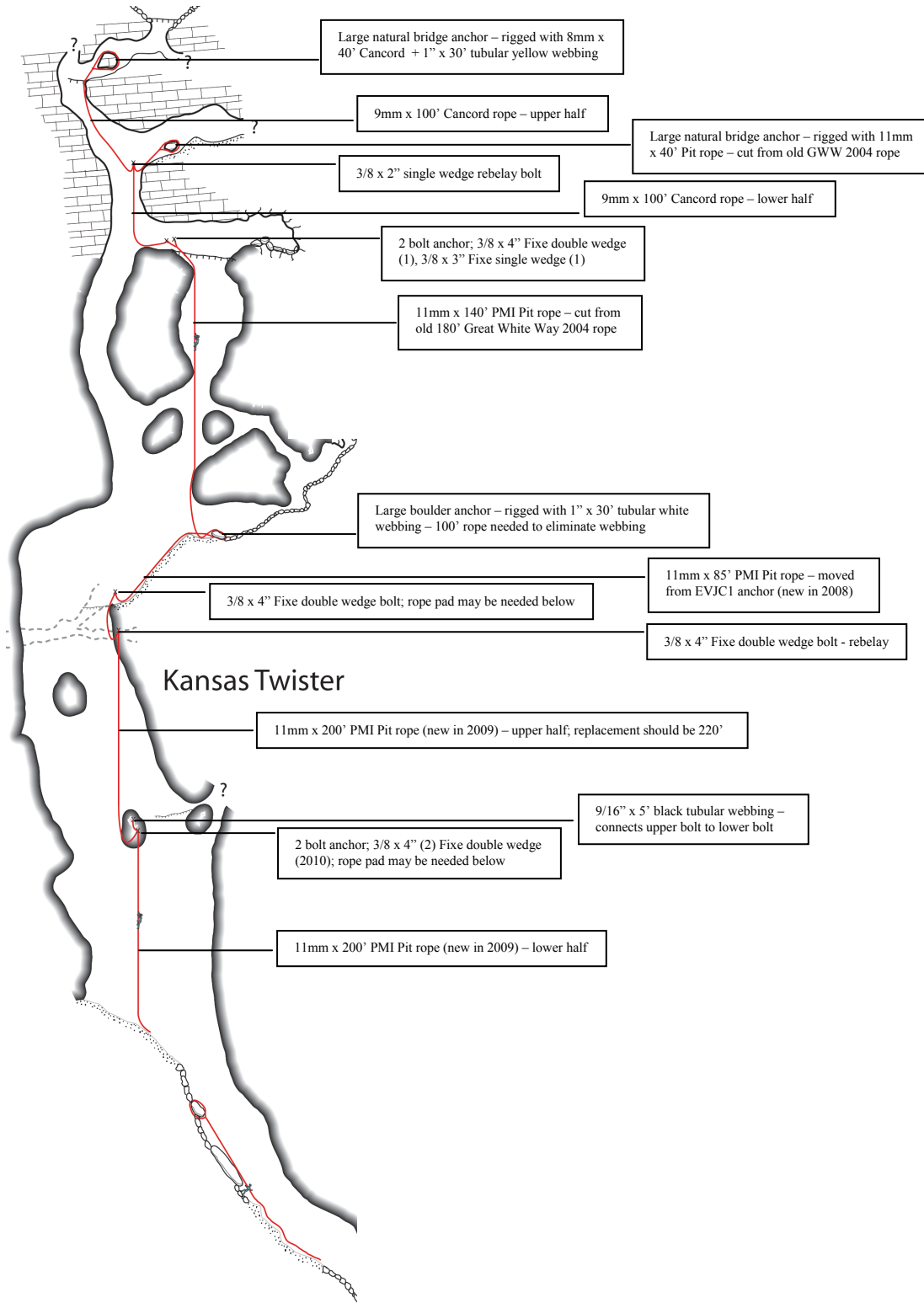
Science

- Three FMD samples were collected in the Rainbow Room for Dr. Diana Northup. These samples represented three slightly different colors.
- The Kansas Twister dome and Oz extend from a low point of approximately -900' to a high point above -100' relative to the entrance elevation within a very short horizontal span. This passes through the Capitan, Seven Rivers and Yates formations and would be an excellent area for further geologic study. The bedded limestone at higher elevations showed a dip of approximately 15 degrees to the south.
- Many areas with green minerals were observed in Oz, appearing to be similar to those in Emerald City. Large areas with clay interspersed with silt and rock flour were also observed, including a large patch of endelite clay near EKT85.

Rigging

- The redirect anchor near the top of the ABCs climb was replaced. A 8' piece of 5.5mm Titan Dyneema cord was run through a short piece of 1" tubular webbing (for abrasion protection) and then tightened around a natural anchor. The attachment to the main rope is with a stainless steel non-locking carabiner. This new anchor is very strong and should last. This redirect is important in preventing the main rope from abrading against edges. The old 3mm cord was removed from the cave.
- A ~20' piece of white 1" tubular webbing is rigged around a natural anchor at the top of the second pitch down in Great White Way. It was not clear if this was abandoned or installed for use in an emergency.
- The bottom rope in Great White Way has a wrap-around rope pad located on the underside of a large natural bridge. This was held in place mostly by friction and a short piece of flagging tape. A short cord was added to keep the pad from migrating out of position.
- Several new anchors and ropes were rigged in the Kansas Twister dome. There was a 200' x 11mm rope rigged at EVJC2 and an 85' x 11mm rope rigged at EVJC1 that were de-rigged and reused. Also, ropes at camp, including a 180' x 11mm, 100' x 9mm and 40' x 8mm were all used in the dome, so there is no more push rope left in camp.
- There are two short sections of personal webbing rigged in Munchkinland as handlines. These are on the slope leading out of the breakdown collapse area, between EKT68 and 69, and at the NE end of the Cowardly Lion Traverse, between EKT69 and 75. The first pitch is up a steep slope and should be rigged with ~40' of 11mm rope as a handline. The Cowardly Lion Traverse has reasonably stable footing, but the consequences of a fall here would be severe, so a permanent traverse line should be installed. Approximately 100' would be required.
- A short climb between EKT90 and 93 is somewhat delicate and insecure. A 40-60' rope should be installed here as a handline.

Kansas Twister Phreatic Dome – Rope and Anchor Notes



Safety

There were no illnesses or injuries, other than minor chafing and abrasions, during the course of the expedition. Two cavers experienced falls in breakdown while traveling back and forth through the Western Borehole that had the potential for more serious injury. Reestablishing a camp in the Far West would reduce the long commutes needed to work in this part of the cave, and would enhance productivity and safety, but it would also increase impact to the camping area and water source. All cavers were able to participate on each day of the expedition.

Lead Lists

Completed Leads

Completed Leads (Far West Expedition 2012 - H34, H35, I34, I35, H36)						
Far West	Area	Nearest Tie-In	Directions from Tie-In		Dimensions	Comments
Quad			Distance (ft)	Bearing		
H34 - Promised Land	Sanctuary	EMG29				surveyed with EMGL1-7
H34 - Promised Land	Sanctuary	EMGH9				surveyed with EMGH9A-E
H34 - Promised Land	Sparadise	N24K	13	NE		no lead - alcove
H35 - Zanzibar	Birthday Present	IBH1	0	down	3'x1.5'	surveyed with IBH14-18
H36 - Western Borehole	Kansas Twister	EVJC2	80	up - west		surveyed with EKT1-102
H36 - Western Borehole	Kansas Twister	EVJC2	80	up - east		surveyed with EKT1-102
I34 - Rainbow Room	Billiard Parlor	N130	5	W	2Hx2W	surveyed with N155-158
I34 - Rainbow Room	Billiard Parlor	N147	10	E	3Hx2W	surveyed with N154
I34 - Rainbow Room	Billiard Parlor	N148	3	N	2Hx2W	surveyed with N153
I34 - Rainbow Room	Jungle	N34	26	S	3'x10'	no lead - alcove
I34 - Rainbow Room	Zanzibar - West	IBHB5	7	SE		too tight
I34 - Rainbow Room	Zanzibar - West	IBHB5	7	SE		too tight
I34 - Rainbow Room	Zanzibar - West	IBHC5	4	NE		surveyed with IBD140-157
I34 - Rainbow Room	Zanzibar - West	IBHC6	18	N		surveyed with IBD140-157
I34 - Rainbow Room	Zombie Zoo	IBD136				surveyed with IBD95A-J
I34 - Rainbow Room	Zombie Zoo	IBD65				surveyed with IBD65A-J
I34 - Rainbow Room	Zombie Zoo	IBD68				surveyed with IBD68A-D
I34 - Rainbow Room	Zombie Zoo	IBD74	3	W		too tight
I35 - Keel Hall	Birthday Present	IBJ18	10	W		too tight
I35 - Keel Hall	Keel Hall	IBP12	5	W	2'x2'	connect to RIB16G - but not surveyed
I35 - Keel Hall	Mirage Room	IFD17	7	SW		hole back up to Mirage Room
I35 - Keel Hall	Mirage Room	IFD36	15	E		hole back up to Mirage Room
I35 - Keel Hall	Mirage Room	IN10	16	E		surveyed with IN33-34
I35 - Keel Hall	Mirage Room	IN12	4	NE		no lead - alcove
I35 - Keel Hall	Mirage Room	IN15	14	W		surveyed with IFD37-49
I35 - Keel Hall	Mirage Room	IN15	7	S		surveyed with IFD37-49
I35 - Keel Hall	Mirage Room	IN16	17	NE		surveyed with IFD55-58
I35 - Keel Hall	Mirage Room	IN18	8	W		surveyed with IFD50-54
I35 - Keel Hall	Mirage Room	IN18	5	SW		surveyed with IFD50-54
I35 - Keel Hall	Mirage Room	IN19	12	NW		no lead
I35 - Keel Hall	Mirage Room	IN19	8	NE		cut-around to IN21/22
I35 - Keel Hall	Mirage Room	IN20	7	W		surveyed with IN36-39
I35 - Keel Hall	Mirage Room	IN20	6	NW		surveyed with IN36-39
I35 - Keel Hall	Mirage Room	IN20	6	SE		cut-around to IN21
I35 - Keel Hall	Mirage Room	IN21	4	E		hole in breakdown - doesn't go
I35 - Keel Hall	Mirage Room	IN23	10	SW		hole in breakdown - doesn't go
I35 - Keel Hall	Mirage Room	IN23	22	SW		surveyed with IN29-32
I35 - Keel Hall	Mirage Room	IN23	31	SW		surveyed with IN29-32
I35 - Keel Hall	Mirage Room	IN23	10	W		surveyed with IN29-32
I35 - Keel Hall	Mirage Room	IN23	10	S		surveyed with IFD37-49
I35 - Keel Hall	Mirage Room	IN24	20	SW		surveyed with IN26-28
I35 - Keel Hall	Mirage Room	IN7	28	SW		surveyed with IN36-39
I35 - Keel Hall	Northern Exposure	IBD10	14	SW		connects to IBDC
I35 - Keel Hall	Northern Exposure	IBD8	17	SW		connects to IBDC
I35 - Keel Hall	Northern Exposure	IBHA1	13	NE		no lead
I35 - Keel Hall	Velvet Underground	IBAC3				surveyed with IBGA27
I35 - Keel Hall	Velvet Underground	IBGA5				surveyed with IBGA24-26
I35 - Keel Hall	Velvet Underground	IBGA7				surveyed with IBGA18-23
I35 - Keel Hall	Zanzibar	IBD45				surveyed with IBD45E-H
I35 - Keel Hall	Zanzibar	IBD47G				no lead
I35 - Keel Hall	Zanzibar	IBD54E				surveyed with IBD54M-T
I35 - Keel Hall	Zanzibar	IBK24	10	NE	?	surveyed with IBK33-34

New Leads

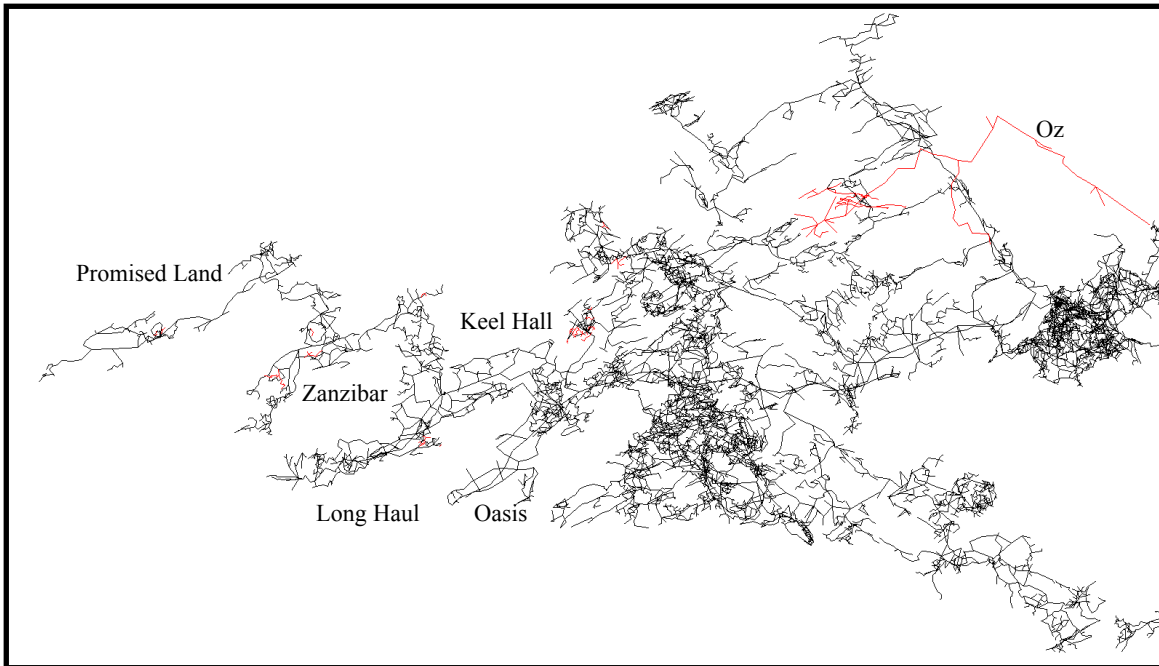
New Leads (Far West Expedition 2012 - H34, H35, I34, I35, H36, H37)						
Far West			Directions from Tie-In			
Quad	Area	Nearest Tie-In	Distance (ft)	Bearing	Dimensions	Comments
I35 - Keel Hall	Long Haul	IBGA25	5	E	5Hx15W	may go back up to Long Haul
I35 - Keel Hall	Birthday Present	IBJ19	0	up	2'x2'	lead going up into sizable airy breakdown chamber
H36 - Western Borehole	Kansas Twister	EKT17	35	up	35Hx10W	Strong free-climbing required. Air.
H36 - Western Borehole	Kansas Twister	EKT26	5	E	2Hx2W	CR coated hole going down. Change of clothes?
H36 - Western Borehole	Kansas Twister	EKT30	25	SW	?	Dangerous climb up into breakdown
H36 - Western Borehole	Kansas Twister	EKT44	10	SE	17Hx2W	Loose rock filled chimney up. No air.
H36 - Western Borehole	Kansas Twister	EKT59	8	SE	3Wx3H	Boneyard crawl
H36 - Western Borehole	Kansas Twister	EKT59	12	up	8x4	Hole in ceiling.
H36 - Western Borehole	Kansas Twister	EKT62	10	NE	8Wx10H	Pit going down - may connect to EKT56.
H36 - Western Borehole	Kansas Twister	EKT56	10	W	12Wx6H	Dome going up - may connect to EKT62.
H36 - Western Borehole	Kansas Twister	EKT56	24	E	2Wx2H	Boneyard crawl
H36 - Western Borehole	Kansas Twister	EKT56	30	E	2Wx2H	Boneyard crawl
H36 - Western Borehole	Kansas Twister	EKT54	15	E	6Wx2H	Loose breakdown choke.
H36 - Western Borehole	Kansas Twister	EKT60	8	N	3Wx3H	Boneyard crawl
H36 - Western Borehole	Kansas Twister	EKT62	5	N	2Wx1H	Tight.
H36 - Western Borehole	Oz	EOZ7	0	down	12x10	Need rope - pit.
H36 - Western Borehole	Oz	EOZ11	0	down	18x18	Need rope - pit.
H36 - Western Borehole	Oz	EOZ11	0	up	10x10	Dome technical lead.
H36 - Western Borehole	Oz	EOZ14	0	up	4x8	Up lead.
H36 - Western Borehole	Oz	EOZ16	12	NE	12x4	
H36 - Western Borehole	Oz	EOZ21	20	N	10x4	Boneyard
H36 - Western Borehole	Oz	EOZ21	15	N	8x4	Boneyard
H36 - Western Borehole	Oz	EOZ21	20	E	4x6	Boneyard
H36 - Western Borehole	Oz	EOZ22	10	W	20x30	Pit. Needs rope.
H36 - Western Borehole	Oz	EOZ22	10	W	40x10	Dome - technical climb.
H36 - Western Borehole	Oz	EKT72	40	SW	15Wx5H	15' technical climb above EKT72B
H36 - Western Borehole	Oz	EKT72	30	S	15Wx20H	Back of Wizard alcove - 70' technical climb
H36 - Western Borehole	Oz	EKT76	80	NW	20Wx30H	35' technical climb up north wall.
H36 - Western Borehole	Oz	EKT79	20	W	15Wx2H	Low lead opens up and goes north.
H36 - Western Borehole	Oz	EKT80	30	NW	50Wx35H	25' technical climb to get up on ledge.
H36 - Western Borehole	Oz	EKT80	45	N	8Wx10H	Upper of 2 leads - may require small climb.
H36 - Western Borehole	Oz	EKT80	45	N	5Wx4H	Lower of 2 leads heading north.
H37 - Manifest Destiny	Oz	EKT87	50	NW	15Wx40H	May require technical climb to get up ledge.
H37 - Manifest Destiny	Oz	EKT87	50	NW	8Wx10H	Clean gear needed to cross flowstone.
H37 - Manifest Destiny	Oz	EKT87	40	NE	5Hx20W	Clean gear needed to cross flowstone.
H37 - Manifest Destiny	Oz	EKT87	100	SE	20Wx10H	High alcove with formations - technical climb.
H37 - Manifest Destiny	Oz	EKT89	30	N	10Wx2H	Ceiling ledge with flowstone - clean gear.
H37 - Manifest Destiny	Oz	EKT92	30	N	6Wx1H	High crawl on north side of small room.
H37 - Manifest Destiny	Oz	EKT92	15	N	6Wx1H	Low level room was checked and needs survey.
H37 - Manifest Destiny	Oz	EKT93	15	S	40Wx100H	Steep fissure above main passage - hard free climb.
H37 - Manifest Destiny	Oz	EKT96	25	W	25Wx20H	Slope heading up to the west.
H37 - Manifest Destiny	Oz	EKT96	25	S	5Wx10H	Steep slope heading up to the south.
H37 - Manifest Destiny	Oz	EKT97	25	N	25Wx15H	Technical climb above 20' ledge.
H37 - Manifest Destiny	Oz	EKT97	25	N	10Wx3H	Lower level crawl lead.
H37 - Manifest Destiny	Oz	EKT99	20	W	20Wx20H	Lead behind formations. Clean gear needed.
H37 - Manifest Destiny	Oz	EKT100	15	SE	15Wx10H	Lead behind white column - climbing and clean gear.
H37 - Manifest Destiny	Oz	EKT102	0	E	105Wx18H	Continuation of main trunk passage.

Open Lead List (updated: June 11, 2012)

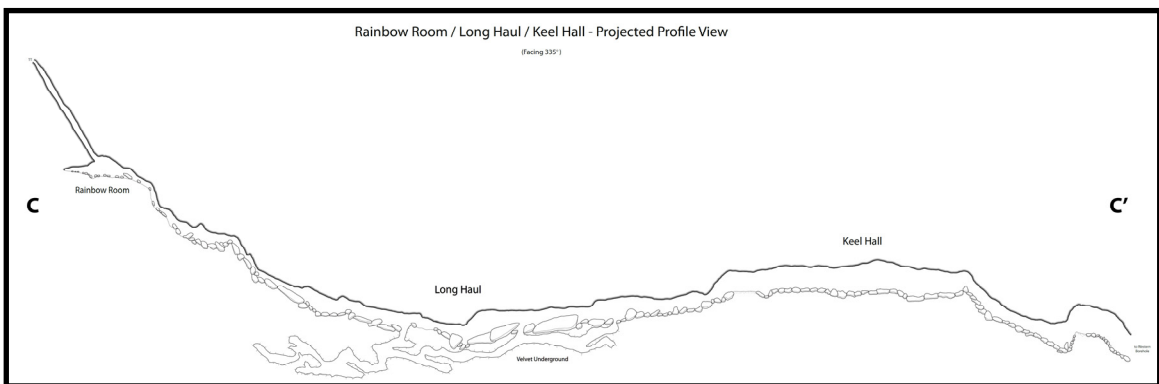
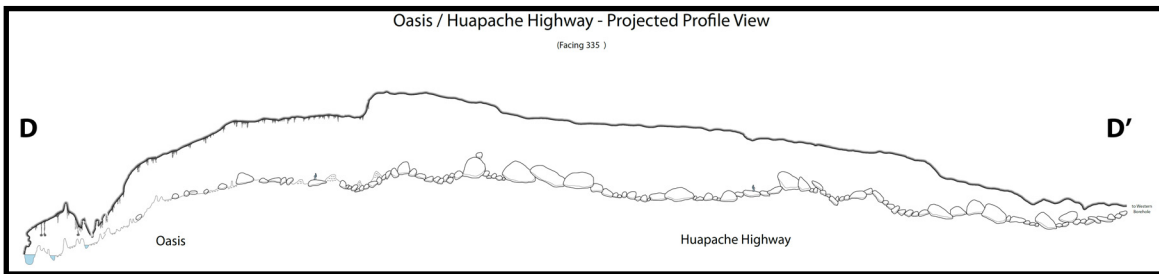
Open Leads (H34, H35, I34, I35)						
Far West			Directions from Tie-In			
Quad	Area	Nearest Tie-In	Distance (ft)	Bearing	Dimensions	Comments
H35 - Zanzibar	Birthday Present	IBDJ12D	20	NE		climb?
H35 - Zanzibar	Birthday Present	IBDJ6	?	N	?	per Barber 11/13/03
I35 - Keel Hall	Zanzibar	IBD46	?	down	3'x3'	hole in floor goes 25' - not drawn on map - 12/4/01
I35 - Keel Hall	Keel Hall	EY95	0	up	2Hx6W	technical bolt climb up overhanging wall
I35 - Keel Hall	Keel Hall	IBE9	15	NW		
I35 - Keel Hall	Keel Hall	IBE9	15	NW		dome
I35 - Keel Hall	Keel Hall	IBE A2	8	S		
I35 - Keel Hall	Keel Hall	IBP21	10	NE	3'x3'	
I35 - Keel Hall	Keel Hall	IBP27	?	?	3'x3'	across drop, not shown on sketch or map
I35 - Keel Hall	Keel Hall	IBP28	12	E	3'x4'	
I35 - Keel Hall	Keel Hall	IBP28	12	W	3'x3'	
I35 - Keel Hall	Keel Hall	IBP4	5	S	1'x2'	grim, down, not drawn on sketch
I35 - Keel Hall	Keel Hall	IBP40	8	N	3'x2'	into breakdown
I35 - Keel Hall	Keel Hall	IBP42	5	W	various	breakdown
I35 - Keel Hall	Keel Hall	IH4	21	SE		
I35 - Keel Hall	Keel Hall	IO14	25	SW	2Hx6W	free climb with runners and belay
I35 - Keel Hall	Long Haul	IBA12N	5	SE		
I35 - Keel Hall	Long Haul	IBA4	20	S		easy chimney climb to aragonite coated fissure
I35 - Keel Hall	Long Haul	IBA4	20	W	4Hx2W	free-climb from left
I35 - Keel Hall	Long Haul	IBA4	20	W	2Hx2W	free-climb from left with exposure
I35 - Keel Hall	Long Haul	IBA4	20	W	10Hx2W	technical climb, 14' up, rope lasso
I35 - Keel Hall	Long Haul	IBA6A	5	S	2Hx4W	technical climb, 11' up, 2 bolts required
I35 - Keel Hall	Long Haul	IBB7	15	NE		difficulty finding in 20 12
I35 - Keel Hall	Long Haul	IBB16	5	SE		down to boneyard
I35 - Keel Hall	Long Haul	IBB32	10	SW		to breakdown, not likely to new passage
I35 - Keel Hall	Long Haul	IBB35	5	NW		more break down, looks uninteresting
I35 - Keel Hall	Long Haul	IBN1	10	S	2Hx6W	up steep fissure, 13' free climb with exposure
I35 - Keel Hall	Mirage Room	IFF7	5	E		
I35 - Keel Hall	Mirage Room	IN4	5	NE		
I35 - Keel Hall	Mirage Room - south	IH10	10	SE		small, steep
I35 - Keel Hall	Mirage Room - south	IH10	16	NE		connects to IM14
I35 - Keel Hall	Mirage Room - south	IM11	7	W		
I35 - Keel Hall	Mirage Room - south	IM13	13	E		
I35 - Keel Hall	Mirage Room - south	IM13A	7	W		down to IF survey?
I35 - Keel Hall	Mirage Room - south	IM14	10	W		
I35 - Keel Hall	Mirage Room - south	IM14	5	SW		
I35 - Keel Hall	Mirage Room - south	IM2	20	W		down to IF survey?
I35 - Keel Hall	Mirage Room - south	IM4	5	SW		
I35 - Keel Hall	Mirage Room - south	IMA4	10	N		
I35 - Keel Hall	Northern Exposure	IBDA13	5	S		
I35 - Keel Hall	Northern Exposure	IBD7	25	NE		low, #11
I35 - Keel Hall	Northern Exposure	IBDA13	5	NE		
I35 - Keel Hall	Northern Exposure	IBDA13	5	S		
I35 - Keel Hall	Northern Exposure	IBDA3	13	NE		to IBD survey?
I35 - Keel Hall	Northern Exposure	IBDA5	7	N		
I35 - Keel Hall	Northern Exposure	IBDA5	7	NE		
I35 - Keel Hall	Northern Exposure	IBHA5	7	NW		
I35 - Keel Hall	Oasis	EY97	0	up	2Hx6W	technical bolt climb up overhanging wall
I35 - Keel Hall	Oasis	EY97	0	up	2Hx6W	technical bolt climb up overhanging wall
I35 - Keel Hall	Paris, TX	IEA15	0	down	3x2	boneyard, loose rock
I35 - Keel Hall	Paris, TX	IEB117	8	N	2Hx2W	boneyard
I35 - Keel Hall	Paris, TX	IEB32	4	N	1Hx2W	boneyard, very tight
I35 - Keel Hall	Rainbow Room	IBA7E	15	E		
Leads Considered Too Delicate and with Low Potential						
H35 - Zanzibar	Nativity Chamber	NB4	8	S		climb over flowstone - too delicate
H34 - Promised Land	Sparadise	N24K	9	N		too delicate and low potential
I35 - Keel Hall	Long Haul	IBQ29	2	W		too delicate - aragonite bushes
I35 - Keel Hall	Zanzibar	IX13	7	NW		too delicate - aragonite bushes
I35 - Keel Hall	Zanzibar	IX13	7	NW		too delicate - aragonite bushes
I35 - Keel Hall	Long Haul	IBGA11	5	SW		too delicate
I35 - Keel Hall	Long Haul	IBGA12	12	N		too delicate
I35 - Keel Hall	Long Haul	IBGA14	10	N		too delicate
I35 - Keel Hall	Long Haul	IBGA15	5	W		too delicate

Maps

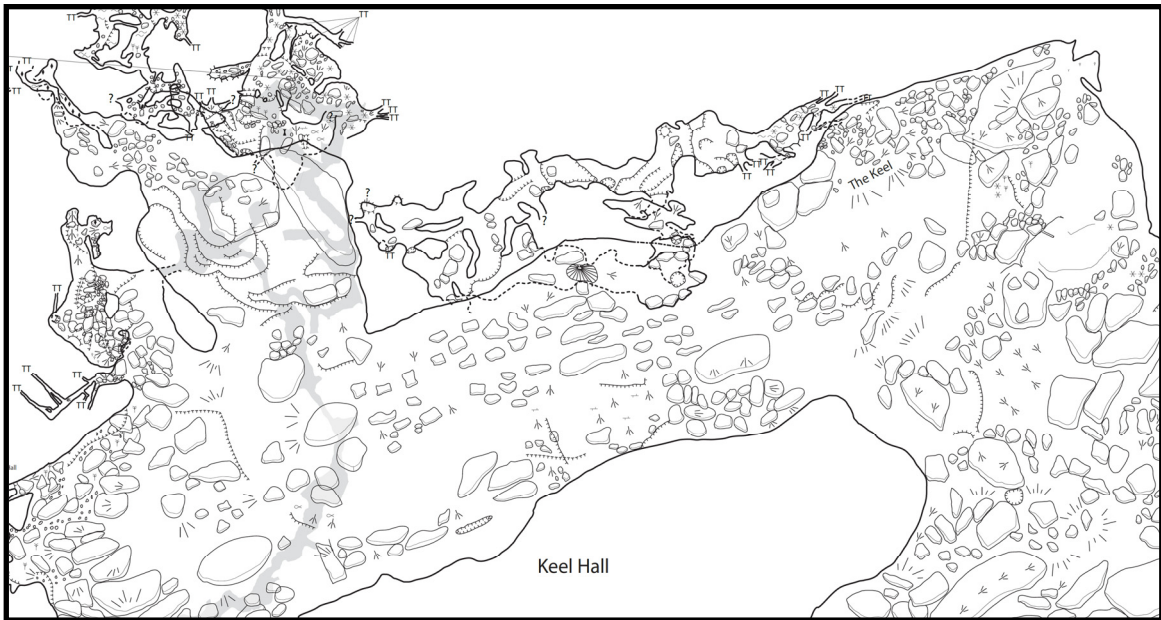
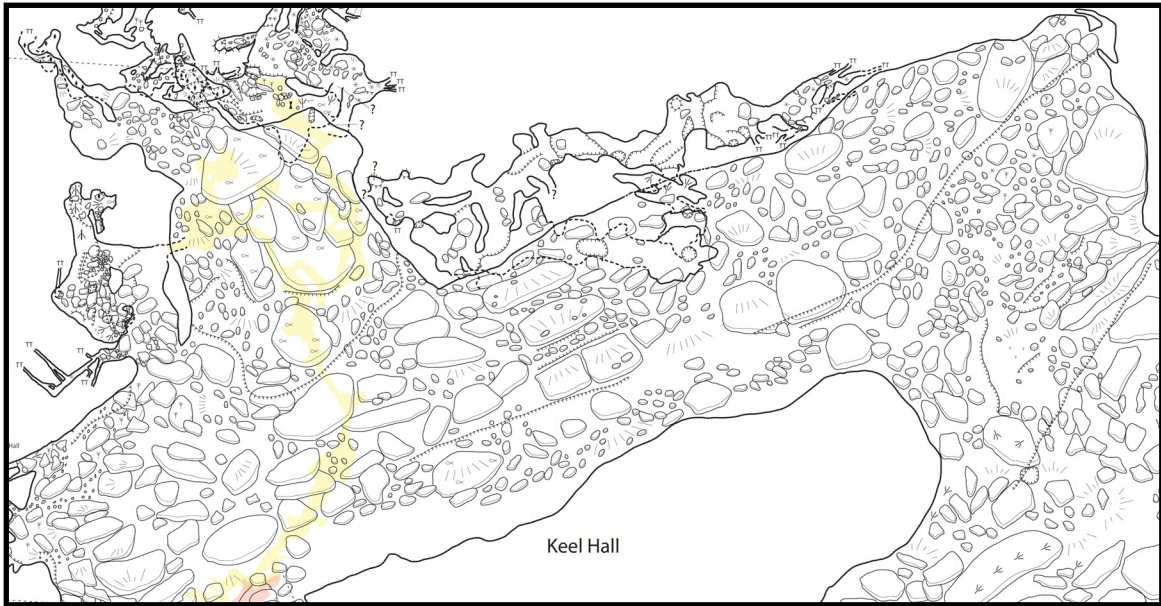
Line plot of Far West with new survey in red.



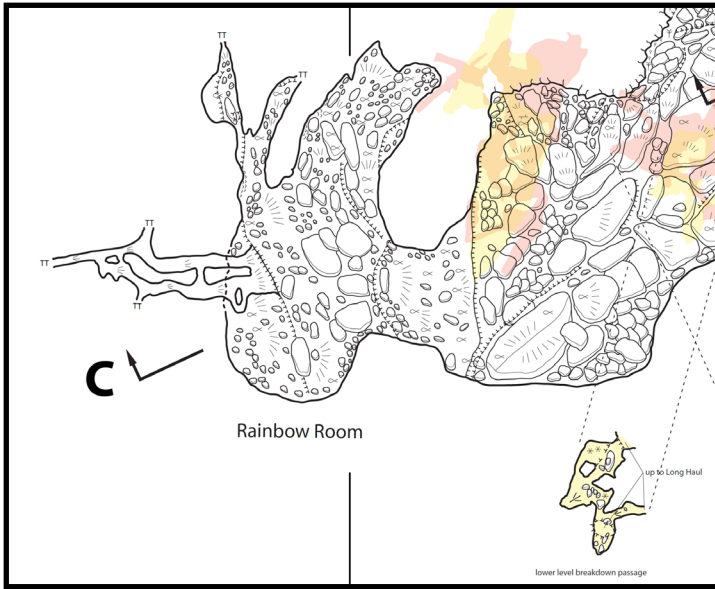
Projected Profile views of Oasis/Huapache Highway and Long Haul/Keel Hall



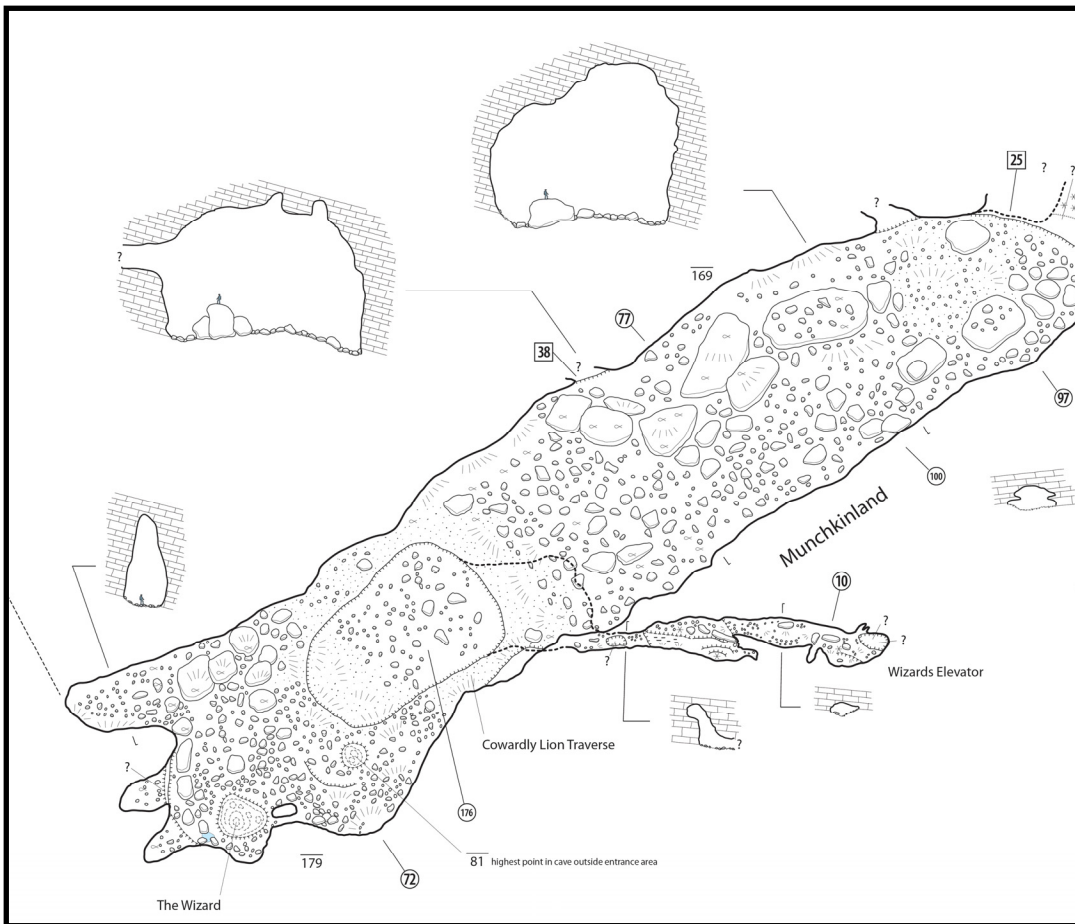
Keel Hall with new sketch (above) compared to old sketch (below)



Rainbow Room with new sketch (above) and old sketch (below)



Munchkinland Borehole in Oz



Conclusion

The expedition was very successful in accomplishing most of the goals set out in the proposal, resulting in 6,654.2' of new cave surveyed, one final blundered loop corrected, resketching of Rainbow Room and Keel Hall, collection of FMD science samples, and a safe and successful climb of the highest known phreatic dome in Lechuguilla or the western continental US. Additionally, an extensive new area was discovered that may prove to be the most important find in over 20 years. All of this was made possible through the efforts of highly skilled and experienced cavers / surveyors and careful pre-planning of survey objectives.

Thanks to all of the expedition team members for their drive, humor, flexibility and hard work. James Hunter utilized his extensive experience, skill and specialized equipment in technical aid climbing to make the Kansas Twister climb achievable. John Lyles provided advice, experience and knowledge of the cave to help teams navigate to objectives and identify important leads. Thanks to Dave, Shawn, Abby and Brian for producing extremely high quality sketches.

Finally, thanks to Dale Pate and Stan Allison in the Cave Resources office for providing information, training, and continuing to give opportunities to less experienced Lechuguilla cavers.

Derek Bristol
Expedition Leader
June 11, 2012