NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D. C. 20594

September 2, 2016

Group Chairman's Factual Report

AIR TRAFFIC CONTROL

WPR15MA243AB

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A. AIRPLANE ACCIDENT

Location: San Diego, California
Date/Time: Sunday August 16, 2015, 1103 Pacific daylight time (PDT)
Sunday August 16, 2015, 1803 coordinated universal time (UTC)
Airplane: N1285U, a Cessna 172M
N442RM (Eagle1), a North American Rockwell 265-60SC

B. AIR TRAFFIC CONTROL GROUP

Ms. Betty Koschig
National Transportation Safety Board
Washington, DC

Ms. Debbie Stern
Federal Aviation Administration (FAA)
Atlanta, GA

C. SUMMARY

On August 16, 2015, about 1103 Pacific daylight time, a Cessna 172M, N1285U, and an experimental Sabreliner, NA265-60SC (Sabre 60), N442RM, collided midair approximately 1 mile northeast of Brown Field Municipal Airport (SDM), San Diego, California. Both aircraft were under control of SDM airport traffic control tower (ATCT) at the time of the accident.

The Cessna was owned and being operated by Plus One Flyers, Inc. of San Diego, California, under the provisions of 14 *Code of Federal Regulations* (CFR) Part 91 as a local flight. The Sabreliner was owned and being operated by BAE Systems Technology Solutions & Services, Inc., under contract for the Department of Defense as a public use aircraft under the provisions of 14 CFR Part 91 as a US Navy sensor testing platform.

The pilot of the Cessna, and the two pilots and two mission specialists of the Sabreliner were fatally injured. Visual meteorological conditions prevailed.

D. DETAILS OF THE INVESTIGATION

On Tuesday, August 18, 2015, the air traffic control (ATC) work group convened at SDM federal contract tower (FCT). The group conducted an in brief with Mr. Mark Demetris, SDM air traffic manager (ATM). Attending the in brief were Mr. William Washington, FAA district manager for the Southern California district; Mr. Emilio Chaviano, Western Service Area quality control group; Mr. Pat Keane, FAA, event investigations manager; Mr. Jon Siverly, Serco quality assurance; Mr. Christopher Thomas, flight standards district office (FSDO) aviation safety investigator; Mr. Robert Hendrickson, FAA, AVP-100; Mr. Jimmie Lamb and Mr. Isidoro Balistreri, FAA San Diego Space and Naval Warfare Systems Command technical operations; and Mr. Andrew Swick, Mr. Patrick Jones, and Mr. Howard Plagens, NTSB investigators. Facility management provided the group a brief summary of the accident and a tour of the control tower.

On Wednesday, August 19, 2015, the ATC group reconvened at SDM. The group reviewed controller records, associated data related to the accident, and conducted an interview with the controller assigned to the combined Local Control (LC), Ground Control (GC), and Controller-in-Charge (CIC) position; the controller had also been the on the job training instructor (OJTI) for the developmental controller

On Thursday, August 20, 2015, the group reconvened at SDM FCT and conducted interviews with the developmental controller who had been training on the LC position and the ATM. The group completed the field notes, and provided an out brief to the ATM. Attending the out brief were Mr. Mark Demetris; Mr. Emilio Chaviano; Mr. Pat Keane; Mr. Jon Siverly, Mr. Dave McCann, Serco operations manager; and Mr. Bill Johnson, Western Service Area quality control group.

1.0 History of Flight

N1285U was a VFR flight operating in the VFR traffic pattern at SDM. Eagle1 was a VFR flight that had been conducting operations offshore and was inbound from the west for landing runway 26 right (26R).

According to the audio data and ATC position logs, a qualified local controller with a controller under instruction were signed on the local control position from 1007 to 1100 PDT. About 1100, the qualified controller took over the communications and the controller under instruction signed off the position.

At 1049:44, the pilot of N1285U contacted SDM ATCT and reported that he was at 2,400 feet over Otay Lake, inbound for touch and go's[1], and had the automatic terminal information service (ATIS) information[2] alpha (A). The SDM local controller instructed the pilot to enter a right base for runway 26R. The pilot read back the instructions. Radar and audio data indicated that SDM was providing ATC services to a Cessna 172 (N6ZP) and a R22 helicopter (N8360R) conducting practice approaches to runway 26R and 26 left (26L), respectively; and a Cessna 206 (N5058U) conducting skydive operations about three miles east of the airport.

At 1052:57, the local controller cleared N1285U for a touch and go on runway 26R, and instructed the pilot to make right closed traffic.[3] The pilot incorrectly read back runway 28R, and the local controller reiterated runway 26R. The pilot read back the correct instructions.

Between 1049 and 1054, the Cessna 172 (N6ZP) and helicopter (N8360R) continued to conduct approaches in the local traffic patterns; the Cessna 206 (N5058U) conducted a full stop landing on runway 26L; a Skybolt (N81962) reported west of the airport for landing runway 26L, and a Citation (XALVV) reported straight in for landing runway 26R.

At 1054:46, the pilot of N1285U advised the local controller that he was, "…gonna go around on two six right (26R)." The local controller responded, "Roger, you're following a Cessna mid right downwind."

[1] Touch-and-go is an operation by an aircraft that lands and departs on a runway without stopping or exiting the runway.
[2] ATIS– The provision of current, routine information to arriving and departing aircraft by means of continuous and repetitive broadcasts throughout the day or a specified portion of the day.
[3] Closed traffic describes successive operations involving takeoffs and landings or low approaches where the aircraft does not exit the traffic pattern.

At 1056:31, the local controller advised the pilot of N1285U that on the next approach he could expect runway 26L. The pilot read back the instructions. Figure 1 is a radar graphic that illustrates the position of all aircraft that were in the SDM airspace at that time. N18WZ was eastbound at 3,600 feet inbound for landing runway 26R; N1285U was turning right downwind at 1700 feet for a touch and go runway 26L; N6ZP was on a right base at 1,300 feet for a touch and go runway 26R; XALVV was at 700 feet descending, on short final for landing runway 26R; N8360R was conducting a touch and go over runway 26L; and N81962 was on a left downwind at 1,700 feet descending for landing on runway 26L.

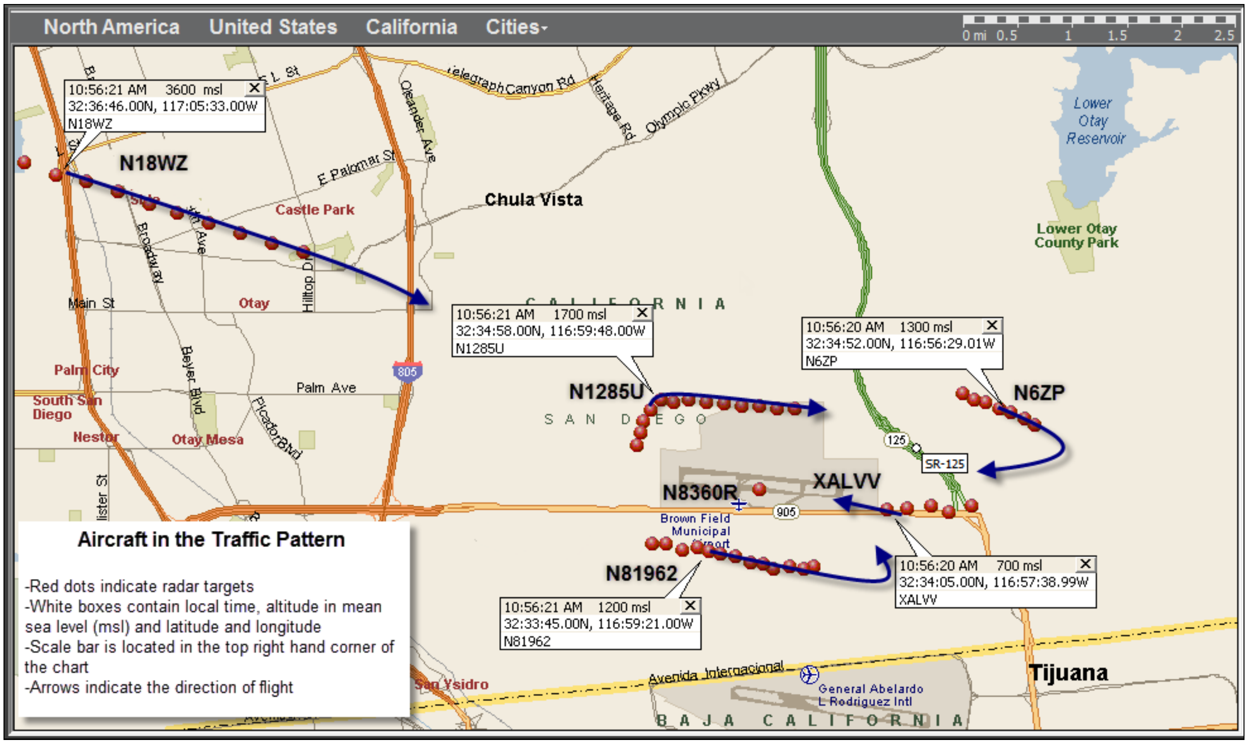

Figure 1. Radar graphic illustrates the number and positions of flights at 1056 PDT, three minutes before Eagle1 checked in with SDM ATCT.

At 1057:22, the local controller instructed the pilot of N1285U that he was, "…number two behind a Skybolt left base runway two six left (26L) clear touch and go." The pilot responded, "…number two in sequence two six left (26L) touch and go."

After N1285U completed the touch and go on runway 26L, the pilot turned the airplane right and entered downwind for runway 26R.

At 1059:04, the pilot of Eagle1 contacted SDM ATCT, reported the flight was nine miles west of the airport inbound for a full stop landing, and had ATIS information bravo (B).

At 1059:08, the local controller instructed the pilot of Eagle1 to, "…maintain at or above two thousand feet enter right traffic for runway two six right (26R)." The pilot read back the instructions.

The published traffic pattern altitude at SDM was 1,526 feet; however, the traffic pattern altitude assigned was commonly rounded up or down to nearest hundred. The local controller explained that he issued an altitude restriction of 2,000 feet to prevent any potential conflict with VFR aircraft operating at the published traffic pattern altitude.

At 1059:50, the local controller again instructed Eagle1 to maintain at or above 2,000 feet, right traffic runway 26R. The pilot read back the instructions.

At 1100:46, the pilot of N6ZP reported, "right downwind departure." The local controller responded, "Right downwind departure approved."

At 1102:14, the pilot of Eagle1 reported, "… right downwind abeam traffic to the left and right in sight." Figure 2 is a radar graphic that illustrates the position of all of the aircraft that were in the SDM airspace at that time. Radar data indicated there were three aircraft to the right and one airplane to the left of Eagle1. To the left of Eagle1 was N6ZP, departing the pattern northeast bound at 2,200 feet. To the right of Eagle1 was N1285U, eastbound on a downwind for runway 26R at 1,500 feet; N8360R westbound on a short final for runway 26L at 800 feet; and N5442P northbound on a right base for runway 26L at 1,500 feet.

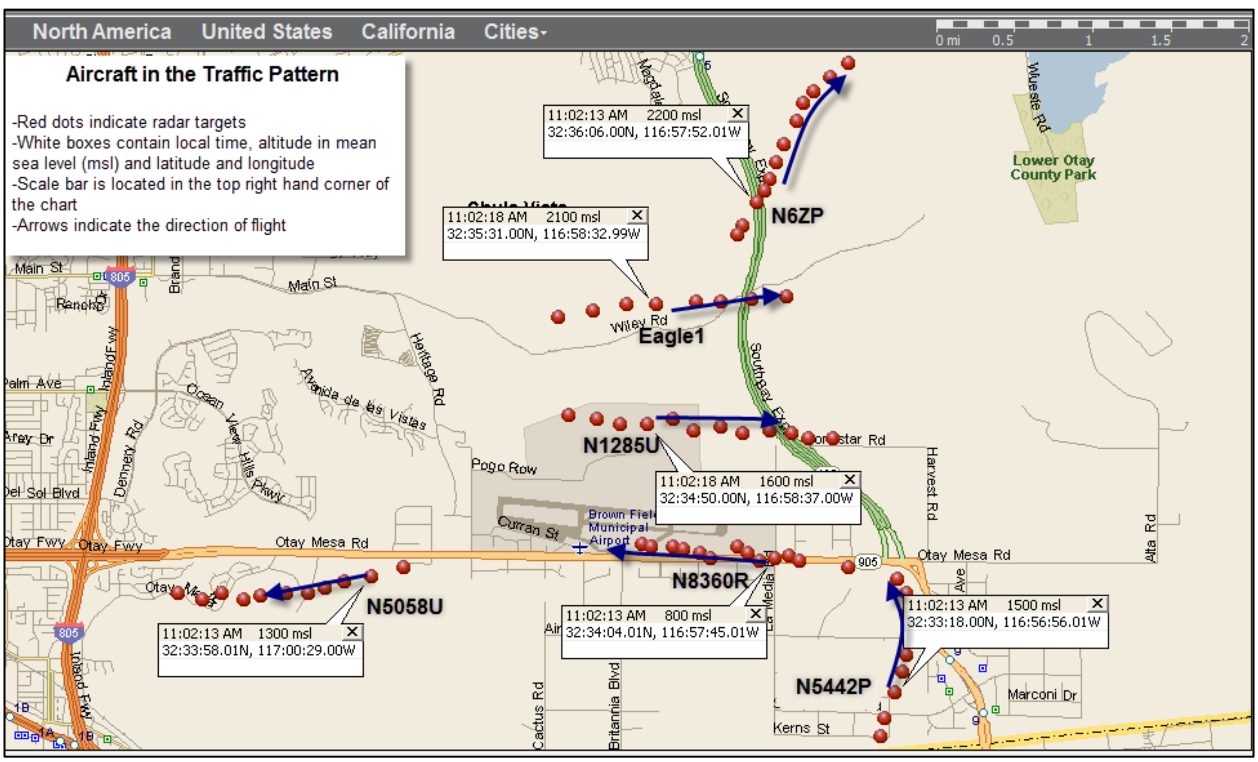

Figure 2. Radar graphic depicting the location of aircraft in the SDM airspace when the pilot of Eagle1 reported traffic to the left and right in sight.

At 1102:32, the local controller instructed the pilot of N6ZP, "…make a right three sixty (360) right three sixty (360) rejoin the downwind." Seven seconds later the pilot responded, "right three sixty (360) rejoin downwind…"

At 1102:42, the local controller instructed Eagle1, "…turn base two six right (26R) clear to land." Three seconds later the pilot responded, "…base gear stop right clear to land."

The local controller stated in his interview that he saw Eagle1 flanked by a pair of Cessnas when the pilot reported that he was, "…abeam and had the traffic to the left and right in sight." The local controller believed that the Cessna on the close in right downwind [to the right of Eagle1] was N6ZP, but it was actually N1285U. The local controller stated that he issued the pilot of N6ZP a right 360-degree turn in order for him to rejoin the midfield downwind and resolve the conflict with Eagle1. He felt that the right turn would help the Cessna avoid Eagle1's wake turbulence.

When N6ZP acknowledged the right 360-degree turn instruction, the local controller stated that in his mind, the Cessna on the right downwind [to the right of Eagle1] had received the instructions and the conflict with Eagle1 would be resolved. Anticipating that the Cessna to the right of Eagle1, on the right downwind at 1,500 feet, would be making a right 360-degree turn, the local controller instructed Eagle1 to turn base, and cleared Eagle1 to land on runway 26R.

The local controller stated that he was scanning and as he looked up to ensure that Eagle1 was turning base he saw the Cessna on the right downwind flying away from the tower.

At 1102:56, the local controller broadcasted to N6ZP, "Cessna six zulu papa tower." Four seconds later the pilot of N6ZP responded, "Turning, Cessna six zulu papa."

At 1103:04, the local controller broadcasted to N1285U, "November eight five uniform, tower." Three seconds later the pilot of N1285U responded, "eight five uniform."

At 1103:08, the local controller asked the pilot of N1285U, "Are you still on downwind sir right downwind." The pilot did not respond. Figure 3 shows the flight track and the last radar targets immediately before the accident.

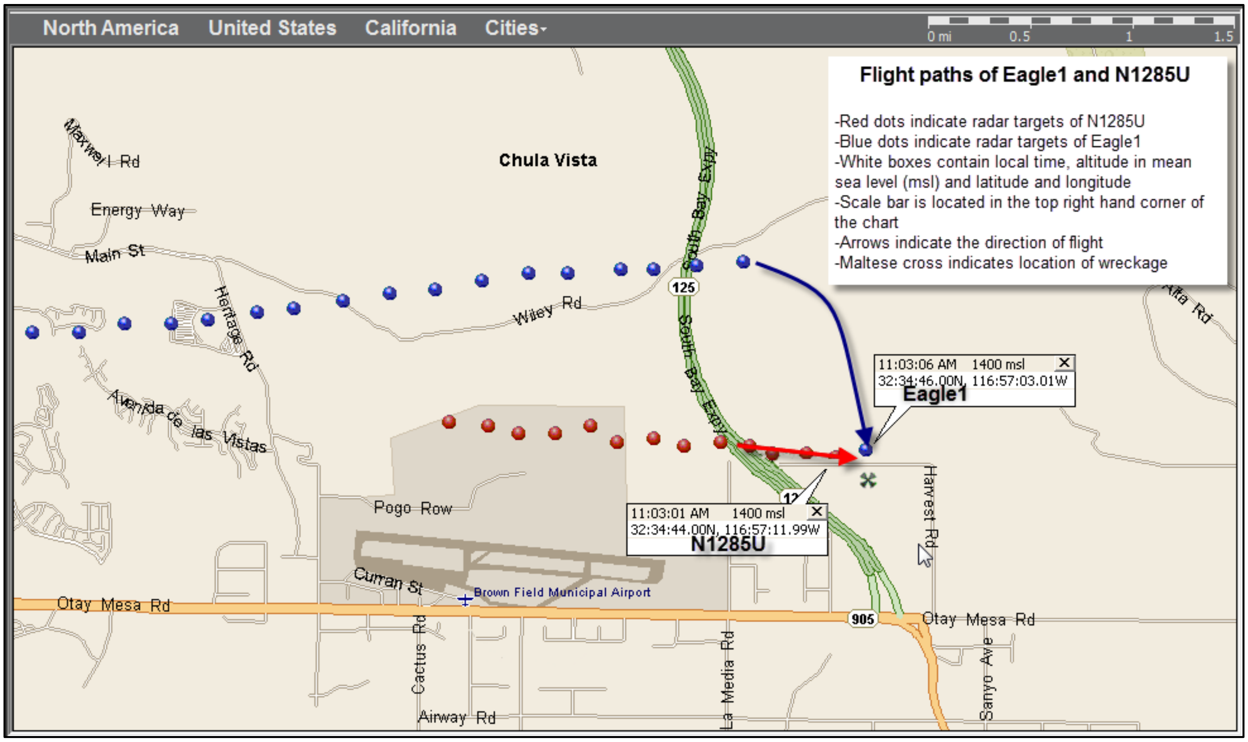

Figure 3. Radar graphic illustrating the flight paths immediately before the accident.

2.0 SDM Airport and ATCT Facility Information

2.1.1 SDM Airport

SDM was a publicly owned airport located approximately 14 nautical miles southeast of San Diego International Airport (SAN), and approximately 1 mile north of the United States/Mexican Border.

SDM had an operational control tower that was staffed daily from 0800 to 2000 PDT. The airport had two active parallel runways:

1. Runway 08L/26R - constructed of asphalt and concrete, measured 7,972 by 150 feet length (L) x width (W).
2.
3. Runway 08R/26L - constructed of asphalt, measured 3,180 by 75 feet (L x W).

Figure 4 shows the location of runways 26R and 26L, and the airport control tower.

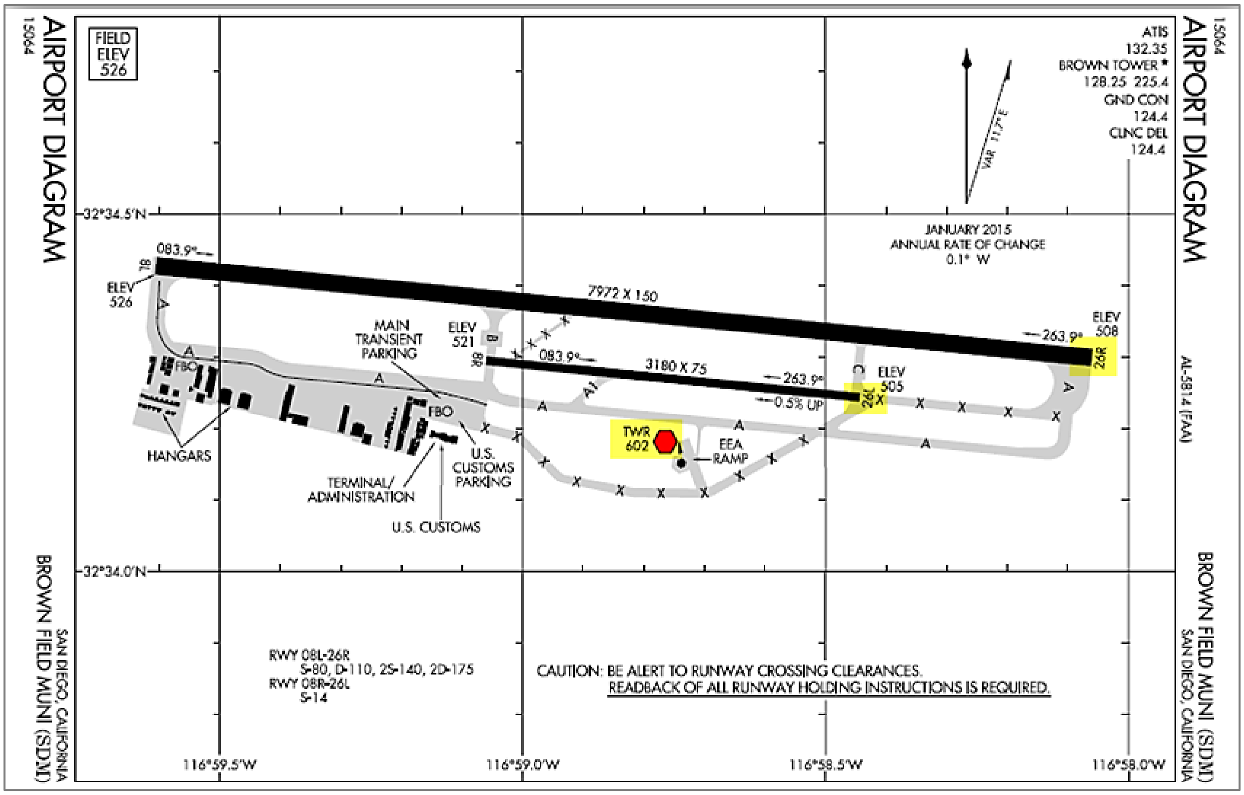

Figure 4. SDM airport diagram depicting the approach ends of runway 26R and 26L, and the location of the control tower.

2.1.2 SDM Class D Airspace

SDM operated within Class D airspace. The dimensions of the SDM Class D airspace were specified in FAA order 7400.9, "Airspace Designations and Reporting Points," which described in part:

> That airspace extending upward from the surface to and including 3,000 feet mean sea level (MSL) within a 2.6 mile radius of SDM, excluding that airspace west of long. 117°01'03" W and south of the United States/Mexican Border. Figure 5 depicts the dimensions of the SDM Class D airspace.

FAA JO 7110.65, "Air Traffic Control," contains a pilot/controller glossary that defines controlled airspace in general and also describes the ATC services afforded in the Class D subset of controlled airspace. The glossary stated in part:

> Controlled airspace is airspace of defined dimensions within which air traffic control service is provided to IFR flights and to VFR flights in accordance with the airspace classification.
>
> c. Controlled airspace in the United States is designated as follows:

4. Class D…unless otherwise authorized, each person must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while in the airspace. No separation services are provided to VFR aircraft.

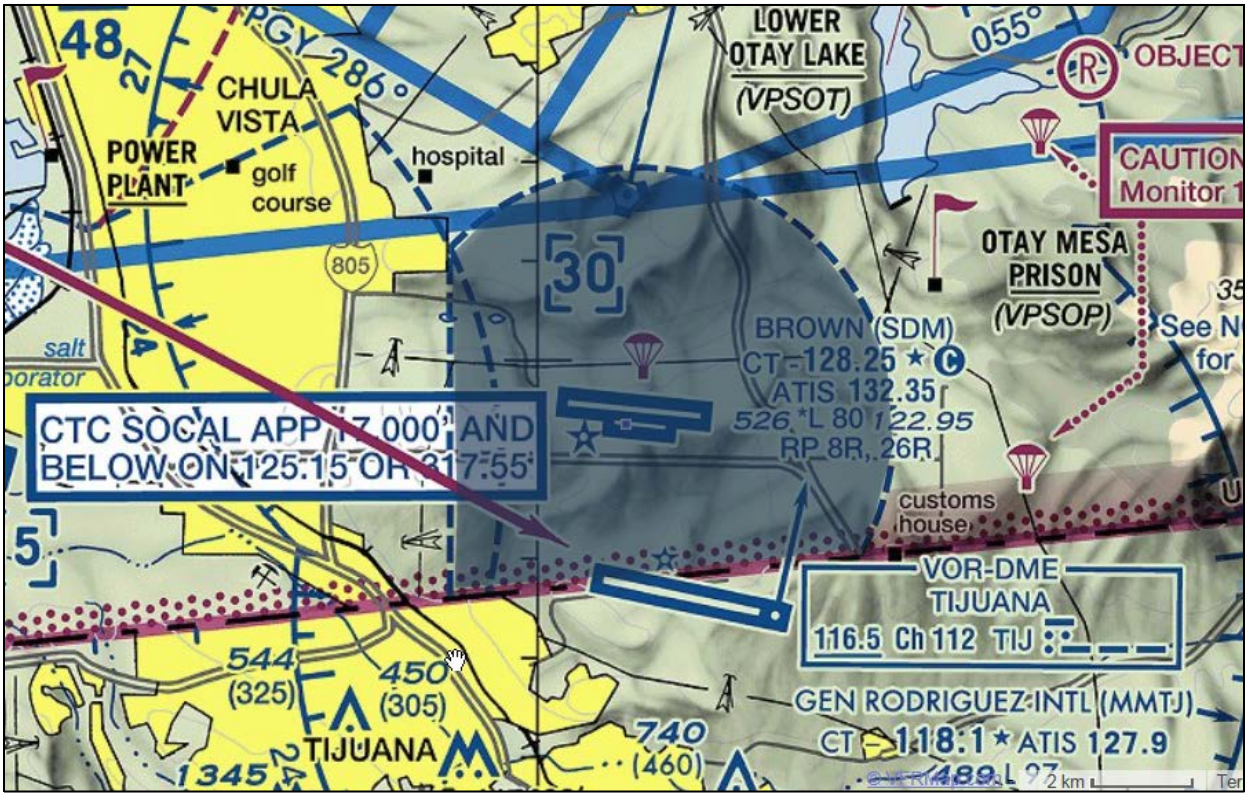

Figure 5. VFR sectional depicting the SDM Class D airspace (blue shading.)

2.1.3 SDM ATCT

The ATCT was an FAA nonapproach control federal contract tower (FCT)[4] operated by air traffic controllers employed by Serco. As described in FAA JO 7110.65, Air Traffic Control, Pilot/Controller Glossary, "Nonapproach Control Tower," a nonapproach control tower authorizes aircraft to land or takeoff at the airport controlled by the tower, or to transit the Class D airspace. The primary function of a nonapproach control tower is the sequencing of aircraft in the traffic pattern and on the landing area.

Figure 6 is an illustration of the SDM tower cab layout. The SDM tower cab was equipped with three control workstations: local control 1 (LC1), located at position 5; local control 2 (LC2) located at position 8; and ground/flight data control (GC/FD) located at position 3.

[4] An FCT is a VFR ATCT providing ATC services under contract with FAA.

At the time of the accident all of the control positions and frequencies were consolidated and being operated from position 3. The workstations and equipment locations are annotated in the legend. Position 3 is located on the west side of the tower cab, and is circled in red.

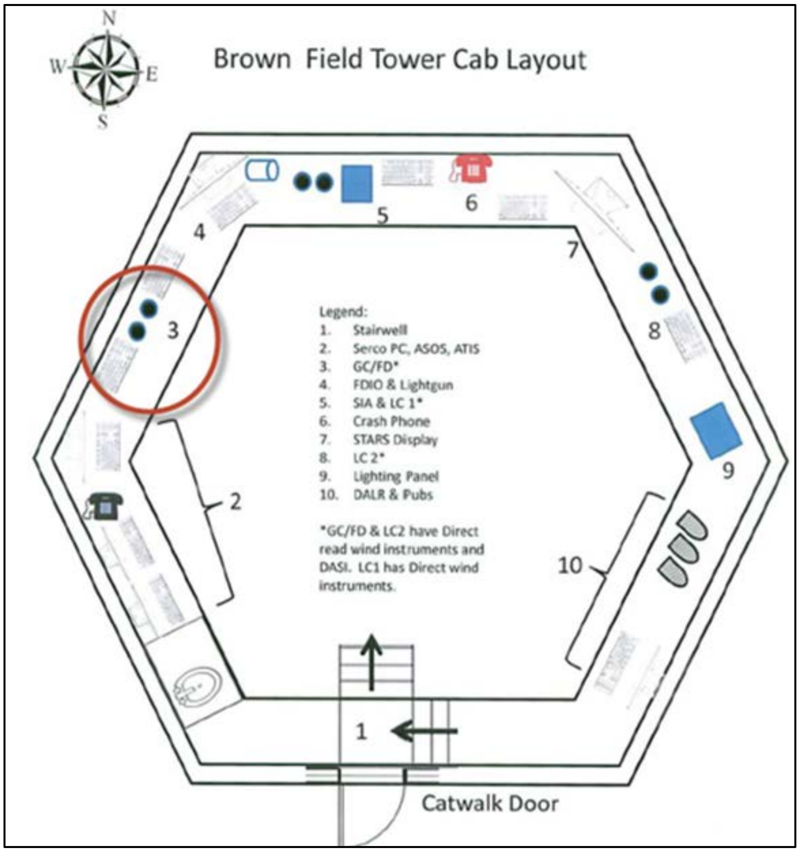

Figure 6. SDM tower cab layout illustration depicting the location of workstations and equipment.

The guidance for consolidating positions at SDM ATCT were defined in the Serco standard operating procedure (SOP), Training Program, Appendix 4, "Training on Consolidated Positions," paragraph B, which stated in part:

> B. Local control, ground control, and flight data positions are combined during various situations. Training may be conducted on consolidated positions at local control, only during light traffic, at the discretion of the OJTI. The OJTI will take into consideration the developmental's progress in training prior to making this decision.

Serco employed five controllers at SDM; this included the ATM who was also a certified CIC and OJTI. The normal staffing schedule for Sundays between 1000 and 1200 PDT was three controllers. SDM ATCT had three controllers in the facility at the time of the accident; two were in the tower cab and one was in the breakroom located at a level below the tower cab.

One of the two controllers in the tower cab was qualified on all positions in the tower, and certified as a CIC and OJTI. The other controller was a developmental controller, qualified on ground and flight data control positions, and training on the local control position. The developmental controller had been under instruction and talking on the local control frequency from 1007 to 1100 PDT. The OJTI indicated that he had been plugged into the frequency and monitoring the local control position during that time, and took over control of the communications and position at 1100 PDT.

Position responsibility when a trainee and an instructor are both signed on a control position was specified in FAA order 7210.3, “Facility Operation and Administration,” paragraph 2−2−3, “Position Responsibility,“ which stated in part:

> When a developmental and an instructor are both signed on at a position, the instructor is responsible for all activity at that position.

As a follow-up to the post interview out brief and discussions with the FAA on 8/26/2015, Serco issued a corrective action plan (CAP) that required all SDM employees review FAA JO 7110.65, para 2-1-6, “Traffic Advisories” and para .2-1-21, “Safety Alerts,” as refresher training, before working an operational position. A copy of the CAP is located in the docket.

2.1.3.1 SDM ATCT Equipment

SDM ATCT was equipped with an operating Certified Tower Radar Display (CTRD). The intended use and purpose of that equipment, in a non-approach control tower, was described in the FAA JO 7110.65, Air Traffic Control, paragraph 3-1-9 (b) and (NOTE), “Use of Tower Radar Displays.” Applicable paragraphs stated in part:

> b. Local controllers may use certified tower radar displays for the following purposes:
>
> > 1. To determine an aircraft’s identification, exact location, or spatial relationship to other aircraft.
> > 2. To provide aircraft with radar traffic advisories.
> > 3. To provide a direction or suggested headings to VFR aircraft as a method for radar identification or as an advisory aid to navigation.
> > 4. To provide information and instructions to aircraft operating within the surface area for which the tower has responsibility.
>
> NOTE−Unless otherwise authorized, tower radar displays are intended to be an aid to local controllers in meeting their responsibilities to the aircraft operating on the runways or within the surface area.
>
> They are not intended to provide radar benefits to pilots except for those accrued through a more efficient and effective local control position.
>
> In addition, local controllers at non-approach control towers must devote the majority of their time to visually scanning the runways and local area; an assurance of continued positive radar identification could place distracting and operationally inefficient requirements upon the local controller.

The interview section of this report discussed the local controller's use of the CTRD.

3.0 ATC Procedures

3.1 Duty Priority

Controllers are confronted with a myriad of situations that require prioritization. General guidance on the priorities of air traffic control duties was provided in FAA JO 7110.65, Air Traffic Control, paragraph 2−1−2 (a) (c), "Duty Priority," which stated in part:

> a. Give first priority to separating aircraft and issuing safety alerts as required in this order. Good judgment must be used in prioritizing all other provisions of this order based on the requirements of the situation at hand.
>
> > NOTE−Because there are many variables involved, it is virtually impossible to develop a standard list of duty priorities that would apply uniformly to every conceivable situation. Each set of circumstances must be evaluated on its own merit, and when more than one action is required, controllers must exercise their best judgment based on the facts and circumstances known to them. That action which is most critical from a safety standpoint is performed first.
>
> c. Provide additional services to the extent possible, contingent only upon higher priority duties and other factors including limitations of radar, volume of traffic, frequency congestion, and workload.

3.2 ATC Service

Controllers provide ATC services to aircraft operating in Class D airspace. The primary purposes, functions, and limitations of ATC services are explained in FAA JO 7110.65, "Air Traffic Control," paragraph 2−1−1, "ATC Service," which stated in part:

> The primary purpose of the ATC system is to prevent a collision between aircraft operating in the system and to provide a safe, orderly, and expeditious flow of traffic, and to provide support for National Security and Homeland Defense. In addition to its primary function, the ATC system has the capability to provide, with certain limitations, additional services. The ability to provide additional services is limited by many factors, such as the volume of traffic, frequency congestion, quality of radar, controller workload, higher priority duties, and the pure physical inability to scan and detect those situations that fall in this category. It is recognized that these services cannot be provided in cases in which the provision of services is precluded by the above factors. Consistent with the aforementioned conditions, controllers must provide additional service procedures to the extent permitted by higher priority duties and other circumstances. The provision of additional services is not optional on the part of the controller, but rather is required when the work situation permits.

3.3 Provide Service

Guidance for providing ATC services by controllers in the airport traffic control terminal area is described in FAA JO 7110.65, Air Traffic Control, paragraph 3−1−1, "Provide Service," which stated in part:

> Provide airport traffic control service based only upon observed or known traffic and airport conditions.
>
> NOTE−When operating in accordance with CFRs, it is the responsibility of the pilot to avoid collision with other aircraft. However, due to the limited space around terminal locations, traffic information can aid pilots in avoiding collision between aircraft operating within Class B, Class C, or Class D surface areas and the terminal radar service areas, and transiting aircraft operating in proximity to terminal locations.

3.3.1 Landing Information

SDM runway 26R had a published right traffic pattern, as noted in the FAA Chart Supplement, Airport/Facility Directory, pp 197, "San Diego, Brown Field Muni." When a right traffic pattern is being utilized to an assigned runway, controllers are required to provide arriving aircraft with specific traffic pattern information. Guidance on specific landing information to arriving aircraft is described in FAA JO 7110.65, "Air Traffic Control," paragraph 3−10−1 (a), "Landing Information," which stated in part:

> Provide current landing information, as appropriate, to arriving aircraft. Landing information contained in the ATIS broadcast may be omitted if the pilot states the appropriate ATIS code. Runway, wind, and altimeter may be omitted if a pilot uses the phrase "have numbers." Issue landing information by including the following:
>
> a. Specific traffic pattern information (may be omitted if the aircraft is to circle the airport to the left).

3.3.2 Traffic Advisories

Controllers are to provide traffic advisory service, to the extent possible, on all known or observed traffic. The definition of traffic advisories and the guidance for applying traffic advisory services are described in the pilot/controller glossary, "Traffic Advisories," which stated in part:

> Advisories issued to alert pilots to other known or observed air traffic, which may be in such proximity to the position or intended route of flight of their aircraft to warrant their attention. Such advisories may be based on:
>
> a. Visual observation
> b. Observation of radar identified and non-identified aircraft targets on an ATC radar display, or
> c. Verbal reports from pilots or other facilities.
>
> Note 2: Traffic advisory service will be provided to the extent possible depending on higher priority duties of the controller or other limitations; e.g., radar limitations, volume of traffic, frequency congestion, or controller workload. Radar/nonradar traffic advisories do not relieve the pilot of his/her responsibility to see and avoid other aircraft. Pilots are cautioned that there are many times when the controller is not able to give traffic advisories concerning all traffic in the aircraft's proximity; in other words, when a pilot

> requests or is receiving traffic advisories, he/she should not assume that all traffic will be issued.

Further guidance on the specifics of providing traffic advisory services to aircraft in *other than* Class A, B, or C airspace was described in FAA JO 7110.65, Air Traffic Control, paragraph 2−1−21 (b), “Traffic Advisories,” which stated in part:

> Unless an aircraft is operating within Class A airspace or omission is requested by the pilot, issue traffic advisories to all aircraft (IFR or VFR) on your frequency when, in your judgment, their proximity may diminish to less than the applicable separation minima.
>
> Where no separation minima applies, such as for VFR aircraft outside of Class B/Class C airspace, or a TRSA, issue traffic advisories to those aircraft on your frequency when in your judgment their proximity warrants it. Provide this service as follows:
>
> b. To aircraft that are not radar identified:
>
> 1. Distance and direction from fix.
> 2. Direction in which traffic is proceeding.
> 3. If known, type of aircraft and altitude.

3.3.3 Traffic Information

Controllers provide traffic information on known or observed traffic. General guidance on providing traffic information was described in FAA JO 7110.65, Air Traffic Control, paragraph 3−1−6, “Traffic Information,” which stated in part:

> b. Describe the relative position of traffic in an easy to understand manner, such as “to your right” or “ahead of you.”
>
> c. When using a certified tower radar display (CTRD), you may issue traffic advisories using the standard radar phraseology.

3.3.4 Spacing and Sequencing

The guidance for a terminal controller to apply spacing and sequencing in was described in FAA JO 7110.65, Air Traffic Control, paragraph 3−8−1, “Sequence/Spacing Application,” which stated in part:

> Establish the sequence of arriving and departing aircraft by requiring them to adjust flight or ground operation, as necessary, to achieve proper spacing.

3.4 Safety Alert

The issuance of a safety alert is contingent upon the capability of the controller to have an awareness of an unsafe condition. The course of action provided will be predicated on other traffic under ATC control. Guidance on the issuance of a safety alert was described in FAA JO 7110.65, “Air Traffic Control,” paragraph 2−1−6 (b), “Safety Alert,” which stated in part:

Issue a safety alert to an aircraft if you are aware the aircraft is in a position/altitude that, in your judgment, places it in unsafe proximity to terrain, obstructions, or other aircraft. Once the pilot informs you action is being taken to resolve the situation, you may discontinue the issuance of further alerts. Do not assume that because someone else has responsibility for the aircraft that the unsafe situation has been observed and the safety alert issued; inform the appropriate controller.

NOTE−
1. The issuance of a safety alert is a first priority once the controller observes and recognizes a situation of unsafe aircraft proximity to terrain, obstacles, or other aircraft. Conditions, such as workload, traffic volume, the quality/limitations of the radar system, and the available lead-time to react are factors in determining whether it is reasonable for the controller to observe and recognize such situations. While a controller cannot see immediately the development of every situation where a safety alert must be issued, the controller must remain vigilant for such situations and issue a safety alert when the situation is recognized.

2. Recognition of situations of unsafe proximity may result from MSAW/E−MSAW, automatic altitude readouts, Conflict/Mode C Intruder Alert, observations on a PAR Scope, or pilot reports.

3. Once the alert is issued, it is solely the pilot's prerogative to determine what course of action, if any, will be taken.

b. Aircraft Conflict/Mode C Intruder Alert.
Immediately issue/initiate an alert to an aircraft if you are aware of another aircraft at an altitude that you believe places them in unsafe proximity. If feasible, offer the pilot an alternate course of action. When an alternate course of action is given, end the transmission with the word "immediately."

Phraseology−
TRAFFIC ALERT (call sign) (position of aircraft) ADVISE YOU TURN LEFT/RIGHT (heading), and/or
CLIMB/DESCEND (specific altitude if appropriate) IMMEDIATELY.

4.0 Pertinent Federal Aviation Regulations

4.1 Compliance with ATC Clearances and Instructions

The pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft. The pilot in command's responsibility for compliance of ATC clearances and instruction was described in 14 CFR 91.123. Applicable sections of the regulation stated in part:

a) When an ATC clearance has been obtained, no pilot in command may deviate from that clearance unless an amended clearance is obtained, an emergency exists, or the deviation is in response to a traffic alert and collision avoidance system resolution

> advisory. When a pilot is uncertain of an ATC clearance, that pilot shall immediately request clarification from ATC.

4.2 Right-Of-Way Rules

The pilot in command's responsibility for compliance of the right of way rules was described in 14 CFR 91.113. Applicable sections of that regulation stated in part:

> (b) General. When weather conditions permit, regardless of whether an operation is conducted under instrument flight rules or visual flight rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft. When a rule of this section gives another aircraft the right-of-way, the pilot shall give way to that aircraft and may not pass over, under, or ahead of it unless well clear.
>
> (d) Converging. When aircraft of the same category are converging at approximately the same altitude (except head-on, or nearly so), the aircraft to the other's right has the right-of-way.
>
> (f) Overtaking. Each aircraft that is being overtaken has the right-of-way and each pilot of an overtaking aircraft shall alter course to the right to pass well clear.
>
> (g) Landing. When two or more aircraft are approaching an airport for the purpose of landing, the aircraft at the lower altitude has the right-of-way, but it shall not take advantage of this rule to cut in front of another which is on final approach to land or to overtake that aircraft.

4.3 Operations in Class D Airspace

The pilot in command's responsibility for compliance of operations in Class D airspace was described in 14 CFR 91.129. Applicable sections of the regulation stated in part:

> (a) Unless otherwise authorized or required by the ATC facility having jurisdiction over the Class D airspace area, each person operating an aircraft in Class D airspace must comply with the applicable provisions of this section. For the purpose of this section, the primary airport is the airport for which the Class D airspace area is designated.
>
> (c) Communications. Each person operating an aircraft in Class D airspace must meet the following two-way radio communications requirements:

5.0 Radar data

Radar data for this report was obtained from the ASR-11 sensor located on Naval Air Station North Island (NZY), San Diego, CA.

6.0 Weather information

The SDM weather for August 16, 2015 was obtained from the KSDM automatic surface observing system (ASOS).

SA METAR KSDM 161753Z 31006KT 10SM CLR 33/19 A2987 RMK AO2 SLP108 T03280194 10339 20189 57001=

Weather for KSDM at 1053 PDT was reported as wind from 310 degrees at 6 knots, clear skies below 12,000 feet agl, temperature 33 degrees Celsius, dew point temperature 19 degrees Celsius, altimeter 29.87. Remarks, station with a precipitation discriminator, sea level pressure 1010.8, temperature 32.8 degrees Celsius, dew point temperature 19.4 degrees Celsius, 6-hour maximum temperature of 33.9 degrees Celsius, 6-hour minimum temperature of 18.9 degrees Celsius, 3-hourly pressure decrease of 0.1.

7.0 Personnel Interviews

7.1 Controller-in-Charge (CIC)/Local Controller (LC)/Ground Controller (GC)

Mr. Timothy Hill began working for Serco in October 2007, at Bellingham International Airport, Bellingham, WA, and transferred to SDM in August 2014. Mr. Hill was qualified on all control positions in the tower, and certified as an OJTI and CIC.

Before working for Serco, Mr. Hill worked for the FAA as an air traffic controller from 1982 to 2006. He had worked at Metropolitan Oakland International airport, Oakland, CA, from 1982 to 1984; Seattle Air Route Traffic Control Center (ZSE), Auburn, WA, from 1984 to 1990; Seattle-Tacoma International airport, Seattle, WA, from 1990 to 1992; Seattle Terminal Radar Approach Control, Burien, WA, from 1992 to 1996; ZSE from 1996 to 2000; and Honolulu Combined Control Facility, Honolulu, HI, from 2000 to 2006.

Mr. Hill served as a United States Air Force air traffic controller from 1975 to 1980, and had been stationed in Tacoma, WA; Altus, OK; and Oklahoma City, OK.

Mr. Hill’s medical certificate was current with a restriction to wear corrective lenses. He stated that he was in compliance with the restriction at the time of the accident. His normal work schedule was Saturday 1215 to 2015, Sunday 1000 to 1800, Monday 0745 to 1745, Tuesday and Wednesday 0745 to 1545, and Thursday and Friday were his regular days off. On Sunday, August 16, 2015, Mr. Hill worked his regularly scheduled shift and was assigned to the combined CIC/LC/GC position. Mr. Hill had been the OJTI for the LC trainee earlier that morning.

Mr. Hill recalled signing on the position about 0945. After he completed his pre-duty briefing process, he asked the controller working the combined CIC/LC/GC position, Mr. Bruce Brown, if he wanted a break or if he wanted him to work the GC position. Mr. Brown said that traffic was very light so he would like to take a break. Mr. Hill plugged into the position, completed a recorded position relief briefing, and took over the position. Mr. Hill stated that tower visibility was generally worse during the morning hours, but the morning of the accident, it was clear.

When the developmental controller, Mr. Steve Price, arrived in the tower for his 1000 to 1800 shift, they engaged in some small talk, and Mr. Hill told Mr. Price that if he wanted to get his headset, he could plug in and get some free time on the position. He informed Mr. Price that he could not document the training hours because the operational positions were combined with

CIC position. Mr. Hill described the traffic as being very light; there was very little going on at that time. Mr. Price plugged in and Mr. Hill provided him a recorded position relief briefing. Mr. Hill explained that the controllers frequently worked combined positions, therefore it was necessary for one person to be able to do it all, and they must be able to manage it all by themselves if it does get busy. Sundays do not generally start getting busy until around 1100 or later. Although they would not normally conduct training with the positions combined, Mr. Hill felt it would benefit Mr. Price to have exposure to the traffic.

The traffic level was “light and not complex” at the beginning of the training session. They had a Cessna conducting a touch and go, another airplane conducting a VHF omni directional radio range (VOR) approach, and skydive operations being conducted nearby. As the session continued, the inbounds on jet traffic started showing up in the arrival list. Mr. Hill knew this would be interesting because he had been trying to teach Mr. Price how to mix jets with slower traffic.

Mr. Hill said that although you do not hear it on the recording, he was coaching Mr. Price on the different options he could use in directing the aircraft to the runway.

Mr. Hill recalled that Mr. Price put the helicopter (N8360R) in front of an airplane that was on the VOR approach. The airplane was rapidly catching up to the helicopter, so Mr. Price instructed the helicopter to enter a right base for runway 26L. At the same time, a Cessna 172 (N6ZP) reported over the reservoir requesting touch and go approaches. Mr. Price instructed the pilot of the helicopter to fly toward the lower end of the reservoir, which put the helicopter to the left side of the airport and the Cessna on the VOR approach to the right side of the airport.

Then N1285U contacted the tower. Mr. Price instructed the pilot to enter a right base for runway 26R, and followed with a clearance to land on runway 26R. There were also active skydiving operations being conducted in the area at that time.

When N1285U reported he was “going around” [on the first approach], Mr. Price instructed the pilot to follow the Cessna on right downwind. . Mr. Price then told the pilot of N1285U to expect runway 26L, and to follow the Skybolt inbound from the west. At this time, the helicopter (N8360R) was inbound for Runway 26L, and the pilot of the skydive airplane called jumpers away, and requested to return to the airport.

Then N16WZ, a Global Express flight, called inbound. Mr. Price instructed the pilot to enter right downwind for runway 26R and maintain at or above 2,000 feet. Mr. Hill explained that the altitude restriction of 2,000 feet was issued to prevent any potential conflicts with VFR aircraft at the published traffic pattern altitude (1,526 feet).

He recalled that Mr. Price had not moved either airplane [N1285U or N6ZP] over to runway 26L and thought that the situation was getting interesting. At that point, Mr. Hill described the traffic volume and complexity as “moderate.”

Mr. Hill stated that he had still been coaching Mr. Price, but knew that he was obviously going to have to take over. Therefore, Mr. Hill told Mr. Price “I got it,” and began transmitting to the aircraft directly. Mr. Hill recalled that he had four immediate issues to resolve:

(1) The jump plane had been instructed to proceed straight-in, but since they were at the edge of the Mexican border, he amended the aircraft’s instruction to “enter left base”;

(2) The helicopter (N8360R) that was on left downwind for runway 26L needed to commence a base turn. Mr. Hill instructed the helicopter pilot to turn base. He noted that the pilot did not immediately respond to or acknowledge the base turn instruction.

(3) They had received an inbound coordination call from Tijuana air traffic facility about an aircraft (N5442P) 15 miles south of Tijuana. The Mexican controllers had provided the wrong aircraft type on the inbound, stating it was a Piper Seminole when it was actually a single-engine Comanche. Mr. Hill said that errors of that nature frequently occur when coordinating with the Mexican controllers.

(4) The potential conflict between Eagle1 and N1285U. Mr. Hill had not received a call from the skydive airplane stating the jumpers were safely on the ground, therefore in an effort to avoid the “Trident area,” where there was active jumpers in the air, he directed his attention at keeping the helicopter (N8360R) and the Mexican inbound (N5442P) away from the skydive area.

Mr. Hill instructed N8360R to increase speed on final approach because that helicopter operator had a common practice of significantly slowing down on the final approach, and when N5442P checked in on his frequency he needed to ensure that did not occur.

Mr. Hill saw Eagle1 on a midfield right downwind when the pilot reported that he was “abeam and had the traffic to the left and right in sight. At that time, Eagle1 was flanked by a pair of Cessnas. Mr. Hill issued N6ZP, which he believed to be the Cessna on the close in right downwind, a right 360-degree turn to rejoin a midfield downwind in an effort to resolve the conflict with Eagle1. He felt the right turn would help the Cessna avoid Eagle1’s wake turbulence.

When Mr. Hill issued the right 360-degree instruction to N6ZP, and the pilot of N6ZP acknowledged the instruction, in his mind the conflict was being fixed [between the Sabreliner and the Cessna on the right downwind]. At that point, Mr. Hill believed that Cessna was N6ZP, but in reality, it was N1285U. Mr. Hill then instructed Eagle1 to turn base and cleared him to land on runway 26R. Eagle1 acknowledged the instruction and commenced his right base turn.

Mr. Hill was scanning everything and saw his traffic. As he looked up to ensure that Eagle1 was turning base and avoiding the skydive area to the east of the field, he saw the Cessna (the intended target of that 360-degree turn) flying away from the tower. Mr. Hill called out to N6ZP, and asked him if he had started his base. The pilot of N6ZP responded “turning.”

Then he called out to N1285U and asked the pilot if he was still on the downwind. He heard the pilot say his call sign and then saw Eagle1 and N1285U impact into a fireball.

Mr. Hill moved to the center of the cab area and grabbed the crash phone. He told Mr. Price to go downstairs and get Mr. Brown back to the tower. Mr. Price threw his headset off, and it went flying past him as Mr. Price left the cab. Mr. Hill then moved closer to the LC position on the east side of the cab.

Coincidentally, at the same time he activated the crash phone, there was a power outage, which knocked out the radar display, clocks, digital audio legal recorder (DALR) computer (which was emitting an alarm), ASOS computer, and the administrative computer that housed the facility logs. The frequencies and landlines were the only things that were working. The fire alarm had also tripped, which caused all the door relay magnets to turn off, causing the doors to lock. Once that occurred, a key was required to reopen the doors [the passcode pad was disabled].

The power outage also caused the elevator to stop. Mr. Brown had been in the elevator on the way up to the tower cab when it stopped, and he was stuck at about the fifth floor.

Mr. Price had not taken his key to the tower cab door, and therefore could not get back into the tower cab. Mr. Hill described the situation as utter mayhem. He was by himself in the tower, Mr. Price was locked out, and Mr. Brown was stuck in the elevator. Mr. Hill then called the Southern California TRACON (SCT) east approach controller position and reported that he had an aircraft collision.

During this time, N5442P landed and taxied to the customs ramp, and Mr. Hill instructed the helicopter (N8360R) pilot to depart the pattern on downwind. Mr. Hill recalled that he transmitted in the blind something like, "is there anyone out there that I missed?" in an effort to ensure all aircraft had been serviced. A skydive airplane and airport operations then called up inquiring about the fire northeast of the airport.

Mr. Hill believed Mr. Brown spent about six to seven minutes on the elevator before he was able to get out. Once Mr. Brown got out of the elevator, he and Mr. Price were able to access the tower cab with Mr. Brown's key, and they were able to assist him.

Mr. Hill called Serco to report the accident and spoke with Mr. Dave McCann. Mr. McCann instructed Mr. Hill to have Mr. Brown or Mr. Price call the ATM, which Mr. Price had already done.

Mr. Hill called Mr. Anthony Remington (another controller that was due to come to work at 1200) to come into work earlier than his assigned shift. Mr. Price had also sent Mr. Remington a text message requesting the same.

Mr. Hill was then relieved by Mr. Brown. They conducted a recorded position relief briefing and Mr. Brown signed on at 1116; the accident had occurred at 1103. Mr. Hill then continued to make required calls while Mr. Price attempted to restore the radar equipment.

He recalled that the clock at the GC position automatically reset and was displaying the correct time, but the clock at the LC position was still blinking. Mr. Hill silenced the DALR alarm and rebooted the system, and Mr. Hill verified that the DALR system was still recording.

Mr. Hill, Mr. Price, and Mr. Brown continued to try to restore equipment and called tech ops to request assistance in ensuring facility equipment was operating. Mr. Hill recalled that he kept asking Mr. Price if he could restore the radar equipment.

Mr. Hill restated several times that things were “still crazy up there [in the tower]” but they did not have any traffic. When the radar display came back up, Mr. Hill said that it appeared to be on a single radar site sensor, because the range rings looked huge; he felt the radar was unusable.

Mr. Hill then went downstairs to call Mr. McCann again. As he went downstairs, Mr. Hill said he was trying to catch his breath and compose himself, but it was very difficult.

After talking to Mr. McCann, he went back to the tower cab to see what he could do to assist the other controllers. By that time, the ATM and Mr. Remington were there, so he left the facility to get a drug and alcohol test.

When he returned to the facility, Mr. Hill “listened to the tapes [audio] to get it in his head what happened out there.”

When asked why he chose a right 360-degree turn for the Cessna that he wanted to separate from Eagle1, Mr. Hill stated that the right 360-degree turn was the best option because of the wake turbulence created by Eagle1. If the Sabreliner had been a lighter aircraft, he would have taken the Cessna to the left.

Mr. Hill was asked what caused him to realize that the Cessna was N1258U and not N6ZP. He said it dawned on him that he had a right downwind departure, and the through process of elimination it could not have been anyone else.

Mr. Hill said, in retrospect, he should have issued a traffic alert; but the moment he realized that Eagle1 was turning into N1258U, it was too late to help.

Mr. Hill stated that he always looked out the window at his traffic. He believed that the radar was unusable. The targets jumped, and he noticed a few seconds delay in the targets, which resulted in them not correlating with the aircraft’s actual position. He used the radar as little as possible, and when he did, it was primarily when he needed to see what aircraft were inbound, and their positions and speeds.

Mr. Hill worked at his previous facility for 7 years and it did not have a radar display in the tower, therefore he was accustomed to not having a radar display and did not need it.
When asked about the approximate distance the accident occurred from the tower, Mr. Hill stated he could not determine how far away the Cessna was (from the tower), or if the Cessna was inside or outside of the Sabreliner on the downwind. When he saw the Cessna and Sabreliner converging, that should have triggered him to give the traffic alert phraseology, but it did not. The last thing Mr. Hill recalled seeing before the accident occurred was the Cessna flying on the downwind, wings level; and the top of the Sabreliner as it was in a banked turn. Then he saw the burst of fire.

Mr. Hill recalled that the last instruction he provided to the pilot of N1285U after he had completed his touch and go was, "…right closed traffic, follow the Skybolt." He did not hear anything else from the pilot after that, and the pilot did not inquire about his sequence. Mr. Hill thought the Cessna pilot was a student.

Mr. Hill said that N1285U flew the downwind leg further than normal, and should have turned base earlier. Mr. Hill believed that the Cessna pilot had no clue the Sabreliner was turning into him.

Mr. Hill explained that his technique in sequencing was to put aircraft with similar speeds on the same runway for the touch and go operations. Each controller had their limit on how many airplanes they can handle, and his limit was four aircraft on runway 26R and three aircraft for runway 26L.

Mr. Hill stated the only type of separation that SDM FCT provided was runway separation, otherwise it was "see and avoid" on the pilot's part.

Mr. Hill plugged into the GC position when he began making phone calls after the accident. However, he moved around the cab, going from the north side and finally the west side.

Mr. Hill said that he was a little unsure where the facility accident notification form (FAA Form 8020-3) was located in the cab, but he knew it was "in the binder." He relied on his memory to make the initial accident reporting calls.

When asked the common practice for conducting a two-minute overlap briefing, Mr. Hill reported the 2-minute position relief briefing overlap was mandatory, but if the controllers needed to waive it, they had to log it. They waive it when there are only two controllers in the tower and they need to swap positions. It was impossible to do an overlap during a position swap. They may also waive the two-minute overlap when a controller needs to be relieved to go to the bathroom. They normally have two people in the tower from 1100 to 1600 daily.

Mr. Hill was asked several questions about training received on STARS FUSION, and the reliability, use, and experience he had with the equipment. He stated that it was not uncommon for the STARS targets to skip, jump, and scatter. For example, he said if a target was tracking on downwind it would jump and you would see it turning north-northeast, and then it would come back retracting several sweeps later. Mr. Hill stated he had worked with many types of radars, but "this is the biggest piece of trash that the agency had ever purchased." Mr. Hill's opinion was that target resolution using the STARS display was unreliable. Mr. Hill had called SCT on several occasions and asked them to put SDM on a single sensor, but they said it had to be kept in FUSION mode.

Mr. Hill stated he had not received any formal training on STARS or FUSION, but they did have a STARS computer based instruction (CBI) module available to them in the facility. He had started working on the STARS CBI during his breaks, and had completed 30 percent of the training. He was told that they were going to get training at San Diego International airport (SAN) tower, but his training did not occur. Mr. Price and Mr. Remington had attended the training in mid July 2014 and were assisting the other controllers with STARS/FUSION; however, no one else in the facility attended the training at SAN. Each person had to build his or her own preference settings on STARS. Mr. Hill preferred to have his settings set to a 13 to 15 mile viewing range.

Mr. Hill stated the FAA began the STARS/FUSION "test mode" nine or ten days before the accident. It did not take him long to figure out that it was worse than their previous radar data processor [automated radar terminal system (ARTS)]. Mr. Hill said that because of that change in radar processing, he was looking at the radar display even less.

When asked about the ability to hear the aural alerts from the radar display, Mr. Hill stated that the minimum safe altitude warning (MSAW) aural alarm in STARS sounds different from that of the ARTS system. When the aural alert activated he did not immediately recognize the sound. Mr. Hill stated the ARTS alert was a lot sharper and louder, "…it got your attention." However, the STARS alert was softer and did not attract attention as effectively as the ARTS alert. He added that since the STARS/FUSION was turned on, the low altitude (LA) and conflict alerts (CA) would activate much more frequently. All of the IFR flights would create a LA alert every time they climbed out; when they had ARTS that did not occur. Mr. Hill stated he did not see the CA when it activated for this accident.

7.2 Developmental Controller/Local Control Trainee

Mr. Steven Alex Price (SP) began working for Serco in May 2015. Before working for Serco, Mr. Price had served as an air traffic controller and security specialist in the United States Marine Corps, and had been stationed in Quantico, VA; Portugal; Republic of Georgia; South Africa, and Miramar, CA. His medical certificate was current with no restrictions. Mr. Price was qualified on the ground and flight data control positions.

Mr. Price's normal work schedule was Wednesday to Friday 1000 to 1800, Saturday 0900 to 1700, Sunday 1000 to 1800, and Monday and Tuesday off. On Sunday, August 16, 2015, Mr. Price worked his regularly scheduled shift and was in the tower but not signed on to a position when the accident occurred. Mr. Price had been training on the local control position from 1007 to 1100.

Mr. Price stated that his shift on the day of the accident was 1000 to 1700, but he had arrived in the control tower between 0950 and 0955. He recalled that Mr. Hill had just relieved Mr. Brown for a break. Mr. Price and Mr. Hill sat in tower cab for a few minutes drinking coffee, and traffic was really slow at that time. Mr. Hill asked Mr. Price if he wanted to train. Mr. Price said yes, so he plugged into the position and they conducted a recorded position relief briefing. Mr. Price stated that he had plugged into the GC position [position 3], but worked the position from the eastern part of the cab. He said he could work better there due to his height and ability to write on the scratch pad. He said that Mr. Hill stood more to the center of the cab, writing on his own scratch pad. They were both plugged in using their headsets.

Mr. Price recalled that N1285U was near upper Otay lake inbound, the Skydive airplane was on the frequency, a helicopter was in the pattern for runway 26L, and a Citation and Global Express had landed runway 26R. He did not recall if N6ZP had been in the pattern at the time.

When Eagle1 called inbound over the coastline, Mr. Price instructed the pilot to enter right downwind at or above 2,000 feet. He then instructed N1285U and N6ZP to expect runway 26L. He had not instructed the pilot of N1285U which traffic pattern to enter, therefore the pilot of N1285U resumed right traffic after the touch and go on runway 26L. He recalled that the pilot of N6ZP then requested to depart to the northeast.

Mr. Price recalled that Mr. Hill said, “I got it” and took over the position while Eagle1 was still over the water. Mr. Price said he remained plugged in and watched Mr. Hill’s actions.

At that point, N6ZP was departing the pattern northeast bound and Eagle1 was flying the downwind. The pilot of Eagle1 checked in abeam the runway approach end and stated he had “traffic to his left and right in sight.” Mr. Price believed that the traffic was N1285U (right) and N6ZP (left), but he was not sure. Mr. Price did not recall if there was any other traffic ‘to the right of Eagle1’ that he may have been referring to when he said he had traffic to the right.

Mr. Price recalled that Mr. Hill instructed N6ZP to make a right 360 degree turn to rejoin the downwind, and he heard Mr. Hill repeat that instruction. The pilot of N6ZP acknowledged that instruction. Mr. Price recalled that he thought that the aircraft on downwind was N1285U, but then second-guessed himself. When N1285U did not start the right turn, Mr. Price then suggested to Mr. Hill that the aircraft on downwind and to the right of Eagle1 may be N1285U. Then he saw the collision occur.

He said to the best of his recollection N1285U was downwind wings level at the time of impact and Eagle1 had barely turned. Mr. Price made visual hand gestures of how he recalled the movement and attitude of the airplanes were just before they collided.

Mr. Hill then instructed Mr. Price to go get Mr. Bruce Brown from his break. As he was going to the break room, he heard Mr. Brown yelling, because he was stuck in the elevator.
When Mr. Price left the tower cab, the doors locked behind him and he could not get back in. Mr. Brown managed to get out of the elevator and had a tower cab key. He and Mr. Price were able to get back into the tower cab. At that point, Mr. Brown relieved Mr. Hill from the position. Mr. Price contacted Mr. Remington at home and told him to come in early, then called the ATM and left a message. When the ATM returned the call, he instructed Mr. Price to open the GC position. After opening GC, Mr. Price then helped to make telephone calls. He remained on the GC position for about 45 minutes, until he was relieved and sent to get a drug/alcohol test. Mr. Price did not want to drive, so his girlfriend came to the tower and picked him up. He had not worked any positions since the accident.

Mr. Price felt his training had been progressing well up to that point. His primary instructor was Mr. Remington and secondary instructor was Mr. Hill. When asked about OJT being conducted by a CIC, Mr. Price stated they try to avoid that, but sometimes it was necessary to accomplish training.

Mr. Price explained that he and Mr. Remington went to the STARS/FUSION training with the SCT controllers at SAN in mid-July. The plan was for them to get the training, come back to

SDM, and train the other controllers. He had assisted other controllers at SDM to set up their STARS profile; they did not receive any other official training on STARS and FUSION.

STARS/FUSION was turned on August 1, but he had thought that the plan was to conduct a series of STARS/FUSION tests before being fully turned on. Because STARS/FUSION was new to them, and they were not used to it, they found it difficult to work with. He explained that the MSAW alert appears to be a lot more sensitive, and when the sensor site detecting an aircraft changes, it frequently causes targets to go into "coast" or disappear. Targets also frequently hop around. He added that since going to STARS FUSION, the CA tended to alert after aircraft passed one another, the LA feature was more sensitive, and targets tended to drop off near San Miguel (mountain). That also occurred when ARTS was in use, but ARTS seemed more reliable than STARS FUSION.

When asked about position relief briefings, Mr. Price said that once the oncoming controller assumed the position, the relieving controller had a required 2-minute overlap. Deviations from the overlap period must be approved by the CIC. Mr. Price said he had not used this waiver.

Mr. Price described the weather/visibility as a clear day, but he could not see the ocean. He did not recall if the sun was a factor.

7.3 Air Traffic Manager

Mr. Mark Demetris began working for Serco in April 2009 at SDM. Before working for Serco, Mr. Demetris had served as an air traffic controller in the United States Marine Corps, and had been stationed in Yuma, AZ; Miramar, CA; Japan; Iraq; and Camp Pendleton, CA. He stated his medical certificate was current with no restrictions. Mr. Demetris was qualified on all positions in the tower and was certified as a CIC and OJTI. He had been the SDM ATM since February 2015.

Mr. Demetris's normal work schedule was Tuesday 1215 to 2015, Wednesday and Thursday 0800 to 1600, Friday 0800 to 1800, Saturday 0800 to 1600, and Sunday and Monday off.

Sunday, August 16, 2015, was Mr. Demetris regular day off. He received a call from the control tower informing him that a midair collision had occurred at the airport. He arrived at the control tower about 1151.

Mr. Demetris stated all entries that were made in the comprehensive electronic data analysis and reporting (CEDAR) system were automatically saved when the power outage occurred. The daily record of facility operations form had handwritten entries because the form had been closed out that night. When a form had the close of business (COB) entry, it could not be reopened to add entries. Mr. Demetris did not know why the accident was not entered into the log before COB.

Mr. Demetris stated that the emergency binder did not have a blank copy of the facility accident/incident notification record, FAA Form 8020-3, when the accident occurred. Mr. Hill had documented everyone he had contacted, and then filled out the 8020-3 on Tuesday, August

18, 2015. After the accident, Mr. Demetris created a dedicated accident/incident binder for the tower.

The facility did not use the CRU-ARTS or ARTS program for position logs; they used an Excel spreadsheet. The Excel worksheet was used because the formulas embedded into the program form would not allow a trainee to sign in on the same position log as the OJTI without causing the OJTI's sign on time to reflect the same time as the trainee signed on. Therefore, a separate position log was utilized for trainees.

SDM did not have a public announcement system for contacting controllers in the building. The telephone speed dial was used for contacting the controllers. Mr. Demetris did not know if the phone system went down when the power outage occurred.

The tower had a backup generator in the event of a power outage. It was maintained by FAA technical operations support staff. Mr. Demetris did not know how long the power was out after the accident.

SDM had a letter of agreement (LOA) with the skydive operator, who was not based at the airport. They did not have a LOA with any of the SDM airport operators.

Mr. Doug Blau was the point of contact for STARS FUSION. They have not been given any definitive direction on STARS. The third test of STARS FUSION began on August 8, 2015, at 0300 PDT. Mr. Price and Mr. Remington completed the STARS training at SAN tower and were tasked with training the other controllers on how to use STARS. Nothing had been added to the read and initial binder regarding STARS.

When the controllers noticed a problem with a radar target, the process for reporting that problem was to enter the code, slew in, tag it, and then call it in. Nothing had been added to the read and initial board regarding how to report anomalies; however, they had a sheet in the tower that described the process.

Mr. Demetris had not seen a problem with excessive CA or LA alerts, and had not seen any target jumps. He felt that STARs was usable for the purpose it was intended at SDM. He had however, experienced target splitting; for example, the actual target may be turning upwind to downwind, but the projected target indicated it was still going upwind. SDM is expected to stay in FUSION mode, but they can switch to single sensor, if required.

Betty Koschig, AS-30
ATC Group Chairman