

DRAFT - Comparison and Analysis of Existing and Proposed Primary Air Ambulances used by Mercy Air Service in Kern County - DRAFT

Bell Helicopter (BHT) 412 and Eurocopter AS350B3

Overview:

Mercy Air Service is proposing to replace the BHT 412 helicopter assigned as the primary aircraft in Mojave with a Eurocopter AS350B3. Mercy's proposal is to use the BHT 412 in a back-up capacity when the Eurocopter is down for scheduled maintenance or otherwise unavailable.

The contract between the County and Mercy Air requires use of the BHT 412 as the primary aircraft assigned to Mojave. Although not defined in the contract, Mercy Air's contract proposal specified use of a BHT 222 as a back-up aircraft.

The BHT 222 has not been in production for many years and parts availability for this aging helicopter model is an escalating problem. According to Mercy Air, the BHT 412 airframe is nearing the end of being able to be sustained and repaired. The BHT 412 has over 16,000 flight hours and airframe cracks, some minor and some major, are found in almost every airframe inspection. These repairs are more complex and time-consuming. Mercy Air states that Bell Helicopters support and turn-around time on parts is an increasing problem. What this equates to is longer downtime of the Bell aircraft operated by Mercy Air.

Air Methods, the parent company of Mercy Air Service, is in the process of modernizing their rotor-wing aircraft nationally. Mercy Air is proposing to place the Eurocopter as the primary air ambulance serving east Kern because of this aircraft's performance in hot weather conditions and significantly lower operating costs. The facts are that neither the BHT 412 or the BHT 222 can be sustained in the future.

The proposed aircraft change represents a significant alternation in the service being provided to the County; therefore, Board of Supervisors' approval of a contract amendment is required.

This report contains the following sections:

- Manufacturer specifications (page 2)
- Comparison Factors of the BHT 412 versus the Eurocopter AS350B3 (pages 2 to 6)
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Manufacturer Specifications and Other Factors Regarding Air Ambulance Used in Kern

| Aircraft | BHT 412 (Mercy) | Eurocopter AS350B3 (Mercy Proposed) | BHT 222 (Mercy) | BHT 407 (Hall Air) |
|--|----------------------------|--|----------------------------|-------------------------------|
| Number of Engines | Twin | Single | Twin | Single |
| Cabin Space (cubic feet) | 220 cu ft | 105 cu ft | utl | 85 cu ft |
| Patient Capacity | 2 | 1 | 1 | 1 |
| Aircraft Total Flight Hours | 16,056 | 1,137 | 10,542 | n/a |
| Average Monthly Downtime for service/maintenance/ repair per month (hours) | 77.4 | 17.8 | 80.9 | n/a |
| Max Altitude (feet) | 11,450 ft | 23,000 ft | 15,500 ft | 20,000 + |
| Max Cruise Speed (knots per hour) | 133 kn | 155 kn | 130 kn | 136 kn |
| Max Range (nautical miles) | 423 nm | 349 nm | 324 nm | 383 nm |
| Max Hover Altitude (in ground effect) | 17,400 ige | 23,000 ige | 10,300 ige | 19,200 ige |
| Useful Load Internal (pounds) | 5068 lb. | 2,224 lb. | utl | 2332 lb. |
| Rotor Diameter (feet) | 46 ft. | 35.1 ft. | 39.8 ft. | 35 ft. |
| Total Length (feet) | 56.2 ft | 42.5 ft. | 49.5 ft. | 41.4 ft. |

Note: Weight limits, altitude limits, speed, range, hover, load, and size are manufacturer specifications. Actual performance may vary because interior alterations and configurations to accommodate an EMS mission can affect load weight and aircraft performance. Items in red indicate better performance factors between the BHT 412 and the Eurocopter.

The table depicts the primary issues for discussion in comparing one air ambulance to another. Each helicopter has distinct advantages over the other. The decision to authorize Mercy Air to replace the BHT 412 with the Eurocopter will ultimately be based on a value judgment over which of the factors are most important to the County in providing EMS services.

Essentially, the data in the table seems to indicate that a newer, smaller, easier to maintain, single-engine aircraft that carries one patient is proposed to replace an aging, larger, twin-engine aircraft that can carry two patients. It can be argued that a twin-engine aircraft is safer than a single-engine aircraft in the event of engine failure; a twin-engine aircraft still has one left and can safely land. However, the aging twin-engine aircraft is more difficult to maintain and is likely to be unavailable for service more often than the newer single-engine aircraft. Further, the proposed Eurocopter's specifications are significantly different than the existing helicopter in Mojave; it represents a significant change in service. But, the proposed Eurocopter is similar in specification to the helicopter operated by Hall Air in Bakersfield, which indicates that precedence for use of an aircraft similar to the Eurocopter has already been established.

Comparison Factors – BHT 412 and Eurocopter AS350E3

The BHT 412 and Eurocopter AS350B3 are vastly different airframes. But, the County has little discretion in discerning the viability over the safety or airworthiness of an aircraft. The Federal Aviation Administration (FAA) holds such responsibility and authority, and the FAA has deemed both the BHT 412 and Eurocopter airworthy. Where the County does have authority is 1) holding the vendor accountable to contractual obligations, and 2) the appropriateness of the aircraft as an air ambulance in providing medical care to a patient. The following are comparison factors that fall within the realm of the County's authority:

1. **Patient Access During Flight:** The BHT 412 has roughly double the interior cabin space (220 cubic feet) in comparison to the Eurocopter (105 cubic feet). It is important to consider that air ambulances transport high acuity (the sickest) patients with conditions that can change at any time. In many cases, IV establishment, endotracheal intubation, and other treatment modalities are completed before a patient is loaded into the helicopter. However, a patient's condition can radically change in-flight. The medical crew may need to gain full access to a patient at any time during the flight. The configurations of the helicopters are such that crews have easier access to patients in the BHT 412 than they do in the Eurocopter.

The following are tasks where access to the patient's body is required. Given the different configuration of the two aircraft, the ability to gain access to the patient during flight is not the same. An assessment of patient access, by task during the flight is shown below:

| <i>Task</i> | <i>BHT 412</i> | <i>Eurocopter AS350B3</i> |
|---------------------------------|------------------------|--------------------------------------|
| Endotracheal Intubation | Full Access | Limited Access |
| Ventilation | Full Access | Full Access |
| Oxygenation | Full Access | Full Access |
| IV Start | Limited Access | Limited Access |
| Med Administration | Full Access | Full Access |
| CPR | Full Access | Severely Limited Access ¹ |
| Vitals | Automated Once Applied | Automated Once Applied |
| ECG, Pulse Ox | Full Access | Full Access |
| Assessment/Reassessment | Full Access | Limited Access |
| Access to Pelvis, Lower Limbs | Limited Access | Severely Limited Access ² |
| Medical Supply/Equipment Access | Full Access | Full Access |
| Communications Access | Full Access | Full Access |

¹ Performing CPR in the Eurocopter requires the crewmember be un-restrained (no seat belts) and kneel on the floor next to the patient. CPR cannot be performed if the crewmember is buckled into the seat.

² Crewmembers will not have access to the patient's pelvic area or lower extremities during flight.

In respect to all categories of patient access during flight, the BHT 412 is superior. For purposes of this analysis, *severely limited access* indicates that the task may not be able to be completed at all while in-flight because of interior space limitations. *Limited access* means that the task can be reasonably carried out with some difficulty. *Full access* means the task can be completed in flight without difficulty.

2. **Two-Patient Transport Capacity:** The BHT 412 is continuously configured for transport of two patients. The Eurocopter can only transport one patient. The following are the number of incidents where Mercy Air transported two patients originating from the same incident over a three-year period:

Year 2006 – 16 times out of 95 annual transports by Mercy Air in Kern (16.8%)
Year 2007 – 12 times out of 141 annual transports by Mercy Air in Kern (8.5 %)
Year 2008 – 7 times out of 197 annual transports by Mercy Air in Kern (3.6 %)
Overall – 35 times out of 433 total transports by Mercy Air in Kern (8.1%)

The data does not indicate a frequent or overwhelming need for transport of two patients, as average over a three-year period shows the need only 8.1 percent of the time; 92 percent of time two-patient capacity was not needed. Yet, the data does indicate that the BHT 412 transported 35 additional patients over a three-year period because of the two-patient transport capacity. The Eurocopter cannot provide this service. In the absence of a two-patient capacity helicopter a second air ambulance would have to be used, or the additional patients would have to be transported by ground ambulance. In eastern Kern, this can be an important factor to consider because of long transport times to a hospital.

3. **Useful Load:** The BHT 412 is a medium lift aircraft with roughly double the weight capability (5,068 lbs.) as the Eurocopter (2,224 lbs.) according to the manufacturer specifications. Different EMS interiors, medical supplies and equipment do influence this data significantly. The BHT 412 has much greater flexibility to manage almost any size and weight of patient(s), and the Bell has greater flexibility with the number of medical attendants serving as crewmembers.

Both aircraft are limited to a patient height of 79 inches (6 feet, 6 inches). Both aircraft can transport a patient weighing up to 300 pounds; but the BHT 412 clearly has more weight capacity. The Eurocopter does not have the same lifting capacity of the BHT 412. It is plausible, under the right combination of air temperature, elevation, and patient size that it may be necessary to leave equipment or a crewmember at an incident site to meet weight/lift limitations, when using the Eurocopter.

4. **Twin Engine versus Single Engine:** Pilots have long debated the value and safety attributes of one engine versus two engines for helicopters. Historically, Mercy Air had frequently cited the two-engine attributes of the BHT 412 and the BHT 222 as a significant beneficial factor in the service it provides. According to the Association of Aero Medical Services, it is recommended that twin-engine aircraft be used for frequent night flights over mountainous terrain.

To compensate for night flying over mountainous terrain in single-engine helicopters, night vision goggles (NVG) are used. These devices allow the pilot to clearly see the terrain and locate a safe landing area in the event of engine failure.

The Eurocopter is a single engine helicopter. The Eurocopter is equipped and the Mercy Air pilots are trained with NVG.

Accident data on both aircraft were gathered from the National Traffic Safety Board. From 2004 to June 2009 within the United States the following occurred:

Eurocopter: Five accidents. All were non-fatal; one had a serious injury. Two of these five accidents involved EMS helicopters.

BHT 412: Two accidents. One accident had no injuries; the other accident had three fatalities. Both cases involved EMS helicopters.

It is difficult to definitively conclude that twin-engine helicopters are safer than single-engine helicopters. As mentioned previously, the FAA has deemed both helicopters as airworthy. The County has not established an EMS air ambulance standard relative to the number of engines. Hall Air Ambulance operates a single-engine air ambulance based at Meadows Field.

5. **Prevalence in the Use of Specific EMS Helicopters in the United States:** It is important to note what types of EMS helicopters are currently being used in the United States. The following is from the ADAMS database for 2007 (excluding military rotor-wing EMS aircraft) operated within the United States:

- 787 total EMS helicopters
- 57% are twin-engine (449 total)
- 43% are single-engine (338 total)
- 5% are BHT 412 aircraft like the one in Mojave (23 total)
- 36% are Eurocopter-type aircraft similar to the unit proposed for Mojave (122 total)

This data shows that the Eurocopter is commonly used as an EMS helicopter. Further, the data indicates that a significant number of single-engine EMS helicopters are currently operating in the United States and that the Eurocopter AS350 is frequently used. A copy of a full report from the ADAMS database is attached on page 15 that shows all non-military EMS helicopters used in the United States.

6. **Aircraft Length & Rotor Diameter:** The Eurocopter is 42.5 feet in overall length with a rotor diameter of 35.1 feet. The BHT 412 is 56.2 feet in overall length with a rotor diameter of 46 feet. This means that the Eurocopter can safely get into a smaller landing zone than the BHT 412. This can be important for emergency scene landings.
7. **Cost to Operate:** The BHT 412 is more than double the cost to operate (\$1,340 per flight hour, including fuel cost) and maintain in comparison to the Eurocopter (\$555 per flight hour, including fuel cost). These costs do not factor in airframe repair costs of the older BHT 412.
8. **Maintenance:** The BHT 412 aircraft operated by Mercy Air is difficult to maintain, according to Mercy Air Service. The aircraft has been down due to maintenance sometimes as long as eight weeks because of complex airframe repairs. A Mercy Air representative likened it to an old car; its still drivable and will probably get you there most of the time, but it breaks down a lot.

The Eurocopter has less overall downtime due to maintenance. This is primarily because it is a newer aircraft. Maintenance and parts availability for the Eurocopter does not seem to be a problem because the aircraft is still in production.

Summary of Comparison Factors:

The eight comparison factors discussed above are listed in the chart below. They are summarized to reflect the attributes of each aircraft in comparison to one another.

| | Factor | BHT 412 | Eurocopter |
|---|-----------------------------------|----------------|-------------------|
| 1 | Patient Access In-Flight | Superior | Inferior |
| 2 | Two-Patient Transport Capacity | Yes | No |
| 3 | Useful Load | Superior | Inferior |
| 4 | Twin-Engine | Yes | No |
| 5 | Prevalence of use in the US | Inferior | Superior |
| 6 | Aircraft Length & Rotor Diameter | Inferior | Superior |
| 7 | Cost to Operate (per flight hour) | Inferior | Superior |
| 8 | Maintenance | Inferior | Superior |

As mentioned previously, the appropriate importance of each comparison factor is more a value judgment than objective fact. Each aircraft type has advantages and disadvantages.

Perhaps, one of the most compelling factors is that the BHT 412 in use today cannot be reasonably sustained mechanically because of the age of the airframe. This affects air ambulance availability in eastern Kern. In other words, mandating the use of the BHT 412 virtually guarantees longer down times due to maintenance and repairs. Availability for response to emergency situations and urgent interfacility transfers is a significant factor in the viability of an air ambulance program; without a reliable vehicle, the program does not serve the County's need.

Request for Proposal Submitted by Mercy Air Service

Mercy Air was assigned to EMS Aircraft Exclusive Operational Area B (EOA B) following a competitive process to select an exclusive provider. Mercy Air's proposal was submitted to the County on October 17, 2007. The proposal constitutes documentation of the services and level of performance the vendor is willing and able to provide. Although only one proposal was received for the area, the County had the authority to reject all proposals and re-start the competitive process. The decision to select the provider was based on the quality of the services being proposed. A significant advantage in the level of service in Mercy Air's proposal was the twin-engine primary (BHT 412) and the twin-engine back-up aircraft (BHT 222), and the primary airship's capacity to carry two patients.

Excerpts from Mercy Air's proposal pertaining to aircraft type, aircraft features, or aircraft replacement are as follows:

"The commitment of a state of the art *twin engine helicopter*, (italics added) to be based in the eastern Kern County area. This *two patient capacity*, (italics added) IFR certified helicopter air ambulance will be stationed at the Mojave Airport for operations in the remote areas of the Kern County Operational Area B."

"Mercy Air Service, Inc. offers a

- State of the art *twin engine* (italics added)
- *Two patient capable* (italics added)
- IFR certified
- NVG equipped helicopter air ambulance that is currently stationed at the Mojave Airport for operations in the remote areas of the Kern County Operational Area B. Mercy Air Service, Inc. will also provide for a back-up helicopter to be used during times of scheduled or unscheduled out-of-service time."

"Mercy Air Service, Inc. operates *twin engine*, (italics added) cabin class aircraft, to better serve the citizens in the area of operation. We offer state of the art medical equipment in good repair, modern communications equipment, up to date navigation equipment, safety equipment (helmets, boots, Nomex flight suits), and perform in a culture that takes operational and safety concerns seriously."

"Helicopters Provided:

1 Bell 412, Serial Number: 33060, Registration Number: N401MA, Year of Manufacture: 1981; Special Features:

- Large cabin
- Powerful, high performance aircraft
- *Twin engine* (italics added)
- IFR certified
- *Two patient capacity* (italics added)
- Long distance capability
- Certifiable for NVG."

"This aircraft has been specifically located in Mojave in order to best serve the Eastern Kern County area. The Bell 412's *two patient ability* (italics added) and long range capability make the aircraft of choice to operate in the remote geography of the Eastern Kern. Equipped with high skid gear and wire strike protection create an optimal aircraft for desert and mountain operations. This model of aircraft

has been used successfully in Kern County operational Area “B” for the past three years. The Mercy Air Service, Inc. fleet of aircraft utilizes a Bell 222U for a back-up aircraft support. A back-up aircraft will be utilized in this proposal to provide continuity of service during those periods of scheduled maintenance down time.”

“Bell 222U, Serial Number: 47540, Registration Number. N402MA, Year of Manufacture: 1985; Special Features:

- Large cabin
- *Twin engine* (italics added)
- IFR certified
- *Two patient capacity* (italics added)
- Long range capable
- Certified for NVG’s.”

“The above rates reflect the charges necessary to provide the aircraft recommended and proposed in our response. We believe that in Operational Area B, *the patients of Kern County would best served by the Bell 412 helicopter.* (italics added) Because of the remoteness of this area, the hot and high performance environment, the advantages of true *two patient transports* (italics added), (~9% of all Kern County calls result in two patient transports), the distance to major medical centers, the Bell 412 will provide the optimum platform in Operational Area B. If the County believes the patients in Operational Area B can be appropriately served by a single engine airframe, Mercy Air Service, Inc. proposes to provide an American Eurocopter AS350B3. The single engine, VFR, single patient capable airframe would generate reduced operational costs allowing for a reduction of the patient charge. The average patient charge would be reduced by 10% if this option were to be implemented.”

“Helicopters are not replaced on a fixed time schedule, but are replaced when different or better technology or capabilities are necessary to properly serve the market. A helicopter may be replaced when operation of an aging helicopter becomes cost prohibitive, or when mechanical reliability issues are of concern. The decision to replace a helicopter is made by the Program Director, in concert with the Regional Maintenance Director, the Regional Aviation Director, and the Regional Vice President and Senior Vice President.”

It can be reasonably argued from the multiple citations gleaned from Mercy Air’s proposal that Mercy Air’s intent was to serve eastern Kern County with a twin-engine, two-patient capacity helicopter. The proposal did have an option for using the smaller Eurocopter airship, but the rates for service would be reduced by ten percent if that option were to be accepted.

Exclusive Operating Area Contract with the County

The contract between the County and Mercy Air Service that was executed subsequent to the competitive bid process obligates Mercy Air Service to comply with the features they proposed. That section reads as follows:

“5. PERFORMANCE STANDARDS:

In consideration for being granted this exclusive right to provide rotor-wing air ambulance services, the PROVIDER agrees to the following:

- 5.1 PROVIDER agrees to continuously maintain all services in accordance with the PROVIDER proposal submitted to the COUNTY and the request for proposal process issued by the COUNTY that has resulted in this AGREEMENT. A summary of the PROVIDER proposal is set forth in Attachment 2, which is attached hereto and made a part hereof.”

In Attachment 2 of the contract, it is specified that Mercy Air Service will provide a Bell 412 twin-engine helicopter as the primary air ambulance to serve Exclusive Operational Area B. Mercy Air committed to deployment of the BHT 412 as their primary resource in their competitive bid. Staff’s interpretation of the contract and Mercy Air’s proposal is that the County was offered the services of a BHT 412 helicopter, and the County accepted and agreed to that level of service. Mercy Air is obligated to abide by the terms of their contract and provide a BHT 412.

Other Considerations

1. Rates for air ambulance service were established as part of the competitive process when selecting an exclusive provider for eastern Kern. Rates are part of the contract and therefore can only be changed with a contract amendment. As noted above the Eurocopter can be operated for less cost than the BHT 412. Mercy Air's EOA proposal included a ten percent discount in rates if the Eurocopter AS 350 were to be deployed as the primary air ambulance. Consequently, it may be appropriate to negotiate a new rate structure if the County agrees to replace the BHT 412 with the smaller aircraft.
2. It should be noted that Bell, Eurocopter, and other helicopter vendors offer contemporary medium lift twin-engine helicopters that have two-patient capacity. These include BK-117, Bell 430, Eurocopter EC 135, Eurocopter EC 145 and others. These same aircraft are owned or leased through Air Methods -- Mercy Air Service's parent company. A representative from Mercy Air has indicated that the twin-engine Eurocopter models have been flown and tested in the southern California area, but the aircraft lack the lifting capacity to effectively operate in the hot temperatures and altitudes found in Exclusive Operational Area B. Limited lifting capacity may reduce the feasibility of flying all patients; larger than average patients may need to be transported by ground ambulance. Or, a crewmember, e.g. the flight paramedic or the flight nurse, may be forced to remain at the emergency scene and be retrieved later to compensate for lift deficiencies.

The following is an inventory of the Air Methods' EMS helicopter fleet as of December 2007:

| Aircraft | Engines | Total | % Fleet |
|--------------------------|---------------|-----------|--------------|
| Augusta 109 | twin | 10 | 3.8% |
| Bell 222 | twin | 26 | 10.0% |
| Bell 412 | twin | 5 | 1.9% |
| Bell 430 | twin | 2 | 0.8% |
| Eurocopter AS 355 | twin | 4 | 1.5% |
| Eurocopter BK 117 | twin | 58 | 22.2% |
| Eurocopter BO 105 | twin | 5 | 1.9% |
| Eurocopter EC 135 | twin | 50 | 19.2% |
| Eurocopter EC 145 | twin | 7 | 2.7% |
| SA 365 | twin | 3 | 1.1% |
| Bell 206 | single | 6 | 2.3% |
| Bell 407 | single | 15 | 5.7% |
| Eurocopter AS 350 | single | 60 | 23.0% |
| Eurocopter EC 130 | single | 10 | 3.8% |
| Total | | 261 | |
| Twin-Engine | 170 | 65% | |
| Single Engine | 91 | 35% | |

Depending on the specific interior configuration many of the twin-engine aircraft listed above may have two-patient transport capacity. Although Air Methods operates contemporary, twin-engine medium lift aircraft with two-patient transport capability similar to the BHT 412, a relatively equivalent replacement has not been offered by Mercy Air Service.

3. Hall Air Critical Care Transport operates a BHT 407 helicopter from Bakersfield. The BHT 407 is a single-engine aircraft that is limited to transporting only one adult patient. The BHT 407 has roughly the same performance and similar weight capacity as the proposed Eurocopter. The BHT

407 is not significantly different than Mercy Air's proposed Eurocopter AS 350, in regards to EMS factors. The interesting circumstance is that there are seemingly two different service levels being provided in the County. EOA B in east Kern is primarily served with a twin-engine two-patient air ambulance, and EOA A in central and west Kern is served with a single-engine one-patient air ambulance. The absence of aircraft standards during the request for proposal process was intentional; competitive proposals were being sought, and the Department did not want to preclude innovative proposals by imposing restrictive standards. Additionally, the FAA regulations severely limit a local jurisdiction's ability to establish its own aircraft standards. As a result, air ambulances of dissimilar service levels serve the County. One of the primary factors where a value judgment must be made in considering Mercy Air's proposed replacement helicopter is: Is it acceptable to now serve east Kern with a lower level of service, which is nearly an identical level of service that is already provided in the remainder of the County?

Summary and Conclusions

Mercy Air Service operates a BHT 412 as the primary air ambulance serving east Kern. Mercy Air is proposing to replace the BHT 412 with a Eurocopter AS 350. Mercy Air Service is contractually obligated to provide a BHT 412, however they are seeking an amendment to the contract to authorize a change in the primary air ambulance.

The existing BHT 412 is an aging, twin-engine aircraft capable of carrying two patients but is frequently unavailable due to maintenance issues. The Eurocopter is a newer, single-engine aircraft capable of carrying only one patient but is available more often because of fewer maintenance issues. During 2006, 2007, and 2008, Mercy Air used the two-patient capability 35 times out of 433 calls – a rate of 8.1 percent. In other words, single-patient capacity was sufficient nearly 92 percent of the time.

Patients are more accessible to the flight paramedic and flight nurse for treatment and assessment in the BHT 412 than they are in the Eurocopter. The lower half of the patient's body either cannot be fully accessed or cannot be accessed at all during flight in the smaller Eurocopter. However, this accessibility issue may not be significant in regards to survivability. Similar air ambulance configurations are commonplace throughout the nation. Hall's air ambulance serving central and west Kern has nearly identical accessibility limitations to the Eurocopter proposed by Mercy Air Service.

The BHT 412 has two engines, and the Eurocopter has one engine. There does not seem to be data available to draw any conclusions as to safety considerations of multiple engines versus one engine. Rather, it seems that the number of engines is more about personal preference than safety. It is analogous to determining which brand of car is better – Ford or Chevy. Staff could not find any definitive data to make objective conclusions.

The Eurocopter is significantly different than the existing BHT 412 in Mojave. It can be argued that this difference represents a significant change in the level of service to be provided in EOA B. But, the Eurocopter is similar in specification to BHT 407 operated by Hall Air Critical Care Transport from Bakersfield. There is no minimum type of EMS aircraft standard adopted by the County. Consequently, it cannot be argued that Mercy Air's proposal is substandard. Rather, the proposal is simply a significant change to the EOA and significantly different than the level of service proposed with the RFP.

The particular BHT 412 airship used by Mercy Air in Mojave is becoming increasingly difficult to maintain. It seems to be prudent for a number of reasons to replace the existing BHT 412 with a new helicopter. Having a viable air ambulance program requires having an aircraft available when needed. However, there are no contractual restrictions that would prohibit replacing the older BHT 412 with a newer one or a comparable helicopter. Mercy Air has not proposed replacing the BHT 412 with a comparable aircraft. In accordance with the contract and original service proposal, it would not be

inappropriate for the County to request/demand that Mercy Air abide by the agreement and provide a comparable aircraft for Mojave.

The proposed Eurocopter AS 350 is less expensive to operate than the existing helicopter. If the BHT 412 is replaced with the smaller Eurocopter, service rates will need to be renegotiated.

Alternatives

Given all of the considerations discussed above, two main alternative actions become available to the County.

1. Demand that Mercy Air Service abide by the contract and continue to provide a primary air ambulance that is comparable in service levels to the BHT 412. Specifically, the replacement aircraft will be a medium lift, twin-engine helicopter with two-patient capacity, equipped with night vision goggles, and instrument flight rules rated. Two likely outcomes will result from selecting this alternative. One is that Mercy Air will work with its parent company Air Methods and deploy a comparable aircraft to Mojave, and the issue of replacing the larger helicopter with a smaller one will not be discussed again. Or, a second plausible outcome is that by forcing higher operating costs, the County runs the risk of compromising the vendor's financial viability and eventually losing the service altogether. A new vendor may emerge, but there are no guarantees that a new vendor would be interested in operating a twin-engine, two-patient capacity helicopter.
2. Agree to Mercy Air Service's proposed contract amendment to operate the Eurocopter AS 350 as the primary aircraft assigned to Mojave. Continue to use the BHT 412 as a secondary aircraft for those periods where the primary helicopter is unavailable due to scheduled maintenance or other repairs. Renegotiate service rates, perhaps by as much as ten percent, to reflect the decreased operational costs.

Recommendation and Rationale

Given the economic turbulence, the growing number of uninsured, medical reimbursement rates, and call volumes in east Kern it is not unreasonable for Mercy Air Service to be seeking a more financially viable aircraft.

The change from a two-patient capacity helicopter to a single-patient model is a significant change in levels of service. But, over a three-year period the vast majority of need (92 percent of the time) was for a single-patient transport. Although the theoretical change in service level may be significant, the actual result in the field is not significant. In those few instances, averaging 12 times per year, when two patients do need to be transported by air ambulance, a second helicopter can be dispatched to the scene.

No compelling evidence has been found to indicate that a twin-engine helicopter is safer than a single-engine helicopter. It would appear appropriate to dismiss this factor as being irrelevant to the decision regarding Mercy Air's proposal.

Use of the Eurocopter will limit the medical flight crew's access to the lower portion of the patient's body during flight. However, this is not an unusual configuration for air ambulances. Most single-patient capacity helicopters have this limitation. Hall Critical Care Transport is allowed to operate in the other portion of the County with a limited access configuration. It is not reasonable to deny Mercy Air's request based on this factor in light of the fact that the County has no prohibition of the practice, and the configuration is already allowed within this jurisdiction. In addition, no evidence is available to the Department that patient outcomes or survivability are affected by interior configuration.

Therefore, it is recommended that Alternative 2 be approved. Allowing Mercy Air to replace the BHT 412 with the Eurocopter AS 350 will not significantly affect patient care quality, and the contract should be amended to authorize the change. As part of amending the contract, service rates must be reviewed and reduced accordingly.

LINKS TO PHOTOS OF THE HELICOPTER INTERIORS

BHT-412 (existing primary Mercy Air helicopter in Mojave; showing two-patient capacity)

http://www.co.kern.ca.us/ems/BHT412_01.jpg

http://www.co.kern.ca.us/ems/BHT412_02.jpg

Eurocopter AS 350 B3 (proposed primary Mercy Air helicopter for Mojave)

http://www.co.kern.ca.us/ems/AS350B3_01.jpg

http://www.co.kern.ca.us/ems/AS350B3_02.jpg

BHT-407 (Hall Critical Care Transport helicopter in Bakersfield)

http://www.co.kern.ca.us/ems/BHT407_01.jpg

http://www.co.kern.ca.us/ems/BHT407_02.jpg

BHT-222 (Mercy Air's existing secondary/back-up helicopter for Mojave)

http://www.co.kern.ca.us/ems/BHT222_02.jpg

http://www.co.kern.ca.us/ems/BHT222_03.jpg

EXAMINATION OF MAKE, MODEL & PILOT STAFFING FOR THE U.S. AIR MEDICAL ROTOR WING FLEET USING ADAMS DATA

Marie Flanigan, Alan Blatt, Maile Miller (CUBRC), Christopher Eastlee (AAMS)

Background: For several years, the Atlas and Database of Air Medical Services (ADAMS) has collected data on U.S. air medical services, including information on flight crew staffing and the Rotor Wing (RW) aircraft used for scene response and inter-hospital transport.

Objectives: Using ADAMS data, summarize

- 1) Number of each of the various RW models in 2004 and 2007.
- 2) Number of single versus twin engine RW in air medical fleet.
- 3) Pilot staffing levels.

Methods: Data collection webforms are provided on the ADAMS website (www.ADAMSairmed.org). Updates to N#, make and model for all RW in the fleet are solicited annually from each of the 260+ air medical RW services. Base locations and staffing levels are also updated &/or re-confirmed each year.

Results: The number of air medical RW in ADAMS has increased over the last 3 years from 637 RW (2004) to 787 RW (2007). (Military RW supporting civilians in AK & HI are excluded from these totals). Over half of the air medical RW models in use are from Eurocopter (or its historical predecessors), a third from Bell, and the balance from Agusta, Sikorsky and MD Helicopters (Table 1). There are more twin engine than single engine type RW in the fleet (Table 1).

Table 1. Number of Rotor Wing Aircraft by Manufacturer & Type (2004 & 2007)

| Fleet Year | Agusta | Eurocopter / Aerospati/MBB | Bell | MD/McDonnell Douglas | Sikorsky | Fleet Total (excl MIL) | Single Engine | Twin Engine |
|------------|---------|----------------------------|-----------|----------------------|----------|------------------------|---------------|-------------|
| 2004 | 50 (8%) | 326 (51%) | 225 (35%) | 13 (2%) | 23 (4%) | 637 (100%) | 258 (41%) | 379 (59%) |
| 2007 | 52 (7%) | 406 (52%) | 281 (36%) | 14 (2%) | 34 (4%) | 787 (100%) | 338 (43%) | 449 (57%) |

The numbers of RW aircraft by model are shown in Figure 1 (2004) & Figure 2 (2007). The two most prevalent single engine RW in use in 2007 are the AS350 (128 RW) and the 206L (99 RW). (Totals include variants.) The two most prevalent twins are the BK117 (103 RW) and the EC135 (86 RW). Figure 3 shows the change in number of each model from 2004 to 2007. Table 2 provides a brief summary of pilot staffing for the RW fleet. There were 2992 air medical RW pilots reported for 2007.

Table 2. RW Pilot Staffing

| Year | # RW Services* | % Services Reporting Pilot Staff | # RW Aircraft* with Pilot Staffing Reported | # RW Pilots | Ratio of Pilots to RW |
|------|----------------|----------------------------------|---|-------------|-----------------------|
| 2004 | 260 | 86% | 602 | 2173 | 3.61 |
| 2007 | 289 | 99% | 817 | 2992 | 3.66 |

*Military units in AK and HI supporting civilian response are included in Service & RW totals.

