From: Dawn Felchle
To: Pamela Colby
Cc: Curt Moore; Chuck Iossi; Wendy Danielson
Sent: Fri 2/3/2012 11:52 AM

Ms. Colby,

Thank you for your phone call this morning as well as this detailed description of your concerns. I will forward this to the County Commissioners and it will be Included as correspondence in their packet for their meeting of February 13th. In the meantime, I know you have been in contact with the Planning Office and I am sure they will follow-up from a review and if necessary an enforcement perspective.

Your patience is appreciated.

Dawn Felchle

Assistant to County Commissioners/ Risk Manager

From: Pamela Colby]
Sent: Friday, February 03, 2012 11:37 AM
To: Dawn Felchle
Cc: Curt Moore; Chuck Iossi
Subject: Report of Violation of Conditions of Approval for Teton Springs Commercial Heli-Pad

Honorable Chair and Members of the Board,

Consistent with our telephone conversations thismorning with Planning staff and your administrative staff, we have been asked to send you a note about violations of the heli-ski operation in our neighborhood, Teton Springs, by High Mountain Heli.

This morning, at approximately 9:35am, we observed a helicopter from High Mountain Heli, approach our neighborhood from the forest property to the south-east. The pilot made an attempt to approach in accordance with the approved flight path, but did not achieve this. He flew along the ridge of the mountains and dropped in to our community prematurely, toward the heli-pad, at an angle that is not consistent with the approved flight plan.

The two departures that we have witnessed so far this morning, were flow radically off the approved flight path. The helicopter flew at a direct angle from the heli-pad to Pole Canyon. We should not be able to see the flights from our home at 125 Cluff Lane if the plane adheres to the approved flight path.

Right at this moment, during the preparation of this message, the helicopter has flown in to our community again, directly in front of our home, at an angle toward the heli pad.

They have again, just now, flow from our neighborhood, directly in front of our home. This is not what was promised. Please protect us by enforcing the terms of approval for this commercial use in our quiet neighborhood. Please restore the peaceful and quiet enjoyment of our neighborhood, as provided by our General Plan.

We respectfully request that High Mountain Heli be immediately ordered to adhere to the approved flight path, as outlined by the conditions of approval.

Pamela and Lucian Carter

From: Pamela Colby
Sent: Friday, February 03, 2012 1:04 PM

To: Dawn Felchle
Cc: Chuck Iossi; Curt Moore
Subject: Violation of Conditions of Approval for Teton Springs Heli-Ski operation

Honorable Chair and Members of the Board,

Having had a communicated with staff earlier today, we understand that the operator has been contacted regarding our concerns about the violation of the approved flight path of the commercial flight operation in our neighborhood.

However, at 1pm today, a returning flight has just accessed the heli-pad, flying IN BETWEEN the Lodge and Condo buildings. How is it possible that this level of "ambiguity" can exist regarding the approved flight path. This is after staff has consulted with the owner of High Mountain Heli.

We respectfully request that you compel the operator to comply with the terms of the interim approval of flight operations out of our otherwise peaceful neighborhood.

Pamela and Lucian Carter

From: Pamela Colby
Sent: Monday, February 06, 2012 12:57 PM
To: Curt Moore
Cc: Chuck Iossi
Subject: Public Information Request

Good day Curt,

Would you please forward me a copy of the conditions of approval for the modification of the Development Agreement for the Teton Springs Golf & Casting commercial heli-ski operation?

I'd love for you to come out in the late morning after a few flights and smell the sweet jet fuel exhaust that accumulates at the east end of the "neighborhood." Stop in by Chuck Iossi's place and breath deep. Fortunately, our home is to the west and is not heavily impacted due to the prevailing winds.

Thanks for your ongoing assistance.

Pamela &Lucian Carter

From: Curt Moore
Sent: Monday, February 13, 2012 12:17 PM
To: Diane Murphy
Cc: Tom Davis; Jeff Naylor; Angie Rutherford
Subject: RE: Helicopter Use in Teton Springs

Hi Diane & K.C.
Thanks for letting us know about the impacts you have first-hand experienced related to the helicopter use at Teton Springs.
I'll place this email in the file and we will look over the comments we've received during this winter's operation.

This helicopter use went through a contentious process and we received over 100 emails, about equally split for and against, even within owners of Teton Springs. The Planning Staff recommended that there would be a one year trail period to evaluate the use's noise, exhaust, and overall disturbance. We will re-evaluate the Teton Springs Heli- operation next spring for the following season 2012-2013.

Please let us know any further observations or opinions you may have.
Regards,

Curt Moore

From: Diane Murphy
Sent: Friday, February 10, 2012 4:25 PM
To: Curt Moore
Subject: Helicopter Use in Teton Springs

Hi, Mr. Moore -

My husband, K.C., and I are full-time residents in Teton Springs; we live at 8 Winger Circle. We moved from Boise almost three years ago and have loved the rural, quiet, pollution-free environment of our community.

We did not attend any of the public meetings regarding helicopter flights in Teton Springs. We have six children, aged 22-28, and a few of them still require a great deal of energy from us.

Since we live in the southwestern corner of the development, we are not frequently disturbed by the helicopter noise unless we are walking outdoors. However, we do walk our dogs several times a week.

Last Sunday morning we were walking on Targhee Trail while the helicopter made several flights from the Teton Springs heli-pad. Although the noise was annoying, the smell from the jet fuel was horrific. Given the fact that we were in the midst of an inversion - very common during the winter in Teton Valley - the stench lingered in the air for the remainder of our walk.

Boise also has winter inversions, and the automobile exhaust and other pollutants inherent in a large city make for a great deal of smog. One of the things we have enjoyed about winters in Teton Springs is the lack of pollution and smog.

Therefore, having our pollution-free development turned into a commercial heliport makes absolutely no sense. Teton Springs is a residential development, nestled against a national forest. It is not - nor should be - a commercial heliport or airport.

I appreciate you taking the time to re-evaluate the appropriateness of permitting a commercial helicopter operation to exist in our residential neighborhood.

Sincerely,

Diane Murphy

In fact, our home does not have a wood-burning fireplace; I believe this is true of all homes in Teton Springs. The developers were concerned about the smoke causing pollution.

From: Curt Moore
Sent: Monday, February 13, 2012 12:17 PM
To: Diane Murphy
Cc: Tom Davis; Jeff Naylor; Angie Rutherford

Subject: RE: Helicopter Use in Teton Springs

Hi Diane & K.C.
Thanks for letting us know about the impacts you have first-hand experienced related to the helicopter use at Teton Springs.
I'll place this email in the file and we will look over the comments we've received during this winter's operation.

This helicopter use went through a contentious process and we received over 100 emails, about equally split for and against, even within owners of Teton Springs. The Planning Staff recommended that there would be a one year trail period to evaluate the use's noise, exhaust, and overall disturbance. We will re-evaluate the Teton Springs Heli- operation next spring for the following season 2012-2013.

Please let us know any further observations or opinions you may have.
Regards,

Curt Moore

Continued on next page.....

Curt Moore

From: Angie Rutherford
Sent: Thursday, February 09, 2012 8:26 AM
To: Curt Moore
Subject: RE: heli-fight path violation

Thanks Curt

Angie Rutherford
Planning Administrator
Teton County, Idaho
208 354-2593

From: Curt Moore
Sent: Wednesday, February 08, 2012 6:18 PM
To: Angie Rutherford
Cc: Kathy Spitzer
Subject: heli-fight path violation

Angie,
I received a call last week from Pamela and Lucian Carter, who live in Teton Springs. Pamela told me that the High Mountain Heli-skiing helicopter had obviously flown off the approved flight path earlier that day. In speaking to Pamela and Lucian, they were very aware that the agreed upon flight path was as follows:

> Flights originating at the "cart barn" area were to fly on a heading of due south, which is a 180 degree bearing. Southbound flights would leave private lands and then enter the National Forests.
> Flights coming from the National Forest were to follow a similar path, taking a due north heading towards the lodge/ cart barn complex.
>
> Pamela told me she understood that the CUP had restricted the flight path even over the National Forest and that the flights were supposed to fly over a high spot in the southern mountains. My recollection about the Planning Commission Public Hearing was that the southbound flight path would likely head slightly east to a small valley where the ship could more gradually attain the altitude it would need to fly over the mountains. I am not sure, but I believe neither of the Carters were at the Board's hearing on this heli-pad item. What she may recall about what was spoken about in the PZC meeting may be a detail about the flights (over national forest) that was not explicitly made a recommended condition by the PZC to the Board. Or possibly the Board did not make a detailed condition about the flights once over the national forest.

Whichever flight path was prescribed over the national forest was a moot point because Pamela and Lucian both told me that the first morning flight (northbound) they observed flew from over the Pole Canyon area and flew across Teton Springs, over their house and to the lodge. Clearly, this was not the approved flight path over the private land. This flight was diagonal to the north-south flight corridor.

Later in the morning, southbound flights from the heli-pad toward the National Forest were also not according to the prescribed flight path.

I called Jon Schick and told him of the problem, which he admitted that the flight had taken place along a route that they had not intended to follow. Jon said that it was a new pilot and that he had not flown this flight path before. Jon said he would radio the pilot and have the due north/ south flight paths followed.

Flights were still in- progress and coming northbound from the Forest. I am not sure what the timing was for Jon to be able to correct his pilot's flight while they were in progress. Jon told me to tell the Carters that they would be welcome

to come to the Lodge and perhaps they could discuss some fine-tuning of the flights so that the problem could be solved.

I called and relayed to the Carters what Jon had said and that the flights would be corrected and that the morning flights had been inadvertent mistakes. The Carters were not sympathetic to the "mistake" and had just witnessed more flights coming in, but they were west of the Lodge Building. They indicated that they expected the flights to be east of the Lodge. I called Jon back and told him he really needed to fly on the north/south bearing. He said he would correct the flights to stay on that bearing.

Curt Moore
Planner
150 Courthouse Drive, Room 107
Driggs, Idaho 83422
Ph: 208-354-2593 ext 200
cmoore@co.teton.id.us

_____ Information from ESET NOD32 Antivirus, version of virus signature database 6871 (20120209)
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The message was checked by ESET NOD32 Antivirus.

http://www.eset.com

_____ Information from ESET NOD32 Antivirus, version of virus signature database 6871 (20120209)
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The message was checked by ESET NOD32 Antivirus.

http://www.eset.com

Curt Moore

From: Curt Moore
Sent: Thursday, February 23, 2012 10:33 AM
To: 'Diane Murphy'
Subject: RE: Helicopter Use in Teton Springs
Attachments: Teton Springs Helicopter USFWS.pdf

Hi Diane,
I contacted the U.S. Fish & Wildlife Service back in December and they sent a biologist out and we went out in the field and looked for the reported nesting site. There have been reports of eagles foraging in the area near around Pole Canyon. I have attached the letter that was written by the biologist, which was forwarded to the Board of County Commissioners.
As I understand it, the bald eagle was removed from the Threatened & Endangered list but still has protections under the Migratory Bird Act. My sense from the biologist was that if a nest was near Pole Canyon, it would be further from the heli-pad than the typical protection zones of a ¼ mile that were in place when the species was listed as T& E. If the helicopter flies where it was approved to fly, straight south and north from the Lodge to the National Forest , then I would not expect it to be over the private property in western Teton Springs.
Regards,

Curt Moore
Planner
150 Courthouse Drive, Room 107
Driggs, Idaho 83422
Ph: 208-354-2593 ext 200
cmoore@co.teton.id.us

From: Diane Murphy [mailto:murphdiane@gmail.com]
Sent: Saturday, February 18, 2012 9:41 AM
To: Curt Moore
Cc: anna@tetonvalleyadvocates.org
Subject: Helicopter Use in Teton Springs

Dear Mr. Moore -

I appreciate your timely response to my previous email. You asked me to write if I had additional concerns, and I do.

We have a pair of nesting bald eagles that live in the National forest at the southern edge of Teton Springs. They have lived here for at least as long as we have. In addition to seeing them fly up into the trees and to the nest, they are seen frequently by many of our residents throughout the year throughout our development.

As an added bonus for K.C. and me, they like to perch on the power poles directly behind our house, which is in the southwestern corner of Teton Springs. These power poles are adjacent to Pole Canyon road.

We normally see them on the poles more frequently in the summer and fall, as they look for rodents from their perch. However, since the helicopters have increased their flights during the past couple of weeks, the eagles have been on the power poles daily. (Due to the lack of snow earlier this winter, helicopter skiing - and flying -

Curt Moore

From: Curt Moore
Sent: Tuesday, April 03, 2012 10:07 AM
To: 'Ty_Matthews@fws.gov'
Cc: Angie Rutherford
Subject: RE: Teton Springs Eagle Observations

Ty,
The letter, as written, is just what we were looking for in terms of acknowledging the eagle nest near Pole Canyon and documenting its proximity to the heli-ski operation's flight path and base. As I understand it, the nest is monitored by a qualified professional and there has been no documentation that the helicopter flights significantly disrupted the nesting activities during its permitted ski season. The heli-ski operation's last permitted day (by Teton County) of the ski season was March 31st.

We will pass along any further observations we receive and would appreciate hearing from the USFWS about the nesting and fledging of eagles in this area. We periodically receive land use applications in Teton County in proximity to various species of concern. If the Planning Staff is aware of the general locations of nests, we will seek official comments from the Service at an earlier point in the review process.

Thanks for assisting Teton County with evaluating the eagles and the federal laws that protect them. A signed copy of the letter would be appreciated.

Curt Moore
Planner
150 Courthouse Drive, Room 107
Driggs, Idaho 83422
Ph: 208-354-2593 ext 200
cmoore@co.teton.id.us

From: Ty_Matthews@fws.gov [mailto:Ty_Matthews@fws.gov]
Sent: Tuesday, April 03, 2012 9:17 AM
To: Curt Moore
Subject: Re: Teton Springs Eagle Observations

Let me know if this works for you and I will send a signed copy.

Ty Matthews, Ph.D.
Fish and Wildlife Biologist
Eastern Idaho Field Office
Chubbuck, ID 83202
W: 208-237-6975 ext. 115
C: 208-242-8302

Curt Moore <cmoore@co.teton.id.us>

03/29/2012 09:36 AM

To "'ty_matthews@fws.gov'" <ty_matthews@fws.gov>
cc
Subject Teton Springs Eagle Observations

Curt Moore

From: Angie Rutherford
Sent: Friday, June 22, 2012 10:21 AM
To: Curt Moore
Subject: FW: Teton Springs HOA Heli-survey comments

Did you get back to Jeff or shall I?

Angie Rutherford
Planning Administrator
Teton County, Idaho
208 354-2593

From: Jeff Naylor [mailto:jnaylor@tetonspringslodge.com]
Sent: Thursday, June 21, 2012 6:11 PM
To: Curt Moore
Cc: Angie Rutherford
Subject: RE: Teton Springs HOA Heli-survey comments

Hello Curt,

Any additional feedback?

Hanks
Jeff

From: Curt Moore [mailto:cmoore@co.teton.id.us]
Sent: Friday, June 15, 2012 11:56 AM
To: 'jnaylor@tetonspringslodge.com'
Cc: Angie Rutherford
Subject: Teton Springs HOA Heli-survey comments

Jeff ,

I WANT TO RUN THIS BY Angie so we can have a valid mail out that is not subject to a lot of reto-active complaints. My comments are below and I will go over this with Angie and see if further refinements are in order. A mailout of next mid -week sounds feasible. I would shoot for a return deadline of 3 weeks plus a couple days to the next Friday, which could be July 13.
See my initial responses below in CAPS.
Regards,
Curt

From: Jeff Naylor [mailto:jnaylor@tetonspringslodge.com]
Sent: Friday, June 15, 2012 7:19 AM
To: Curt Moore
Subject: First draft

Good morning Curt,

Attached is a copy of the first draft (word and pdf) of the letter to be sent to Homeowners of Teton Springs. Grand Teton Property Management will assist in the mailing and collection of surveys. Jon Wilson, president of the HOA, has

approved use their mailing list and agreed to have the letter come from the HOA if we so desire. I think it is a great idea.
THAT SEEMS BETTER THAN COMING FROM THE LODGE OR TETON SPRINGS GOLF & CASTING.
FROM THE SURVEY, HERE ARE MY COMMENTS:
1) Limited to winter only. December 26 thru March 31 (dates for winter 2012-13 tbd) IF YOU ARE PROPOSING EARLIER OR LATER DATES FOPR NEXT YEQAR, LET US AND ALL HOA FOLKS KNOW WHAT THE PROJECTED DATES ARE.
2) Limited to specific hours of operation each day (Not to operate before 9:00am or after 4:00pm) IF YOU WANT LATER THAN 4:00 pm, LET THEM KNOW
3) Limited to no more than 40 flights each winter I WOULD SAY 40 DAYS OF FLYING PER SKI SEASON FROM -LATE DECEMBER TO APRIL 1
4) Limited numbers of flights each day I WOULD SPECIFY 7 ROUND TRIP FLIGHTS PER DAY
5) Limited to a specific flight path. Helicopter flies directly south from the existing heli-pad, next to the cart barn, over the snack bar between holes 9 and 11 into the Caribou-Targhee Forest. A SMALL MAP MIGHT BE GOOD FOR THIS

Our thought was to keep the survery/letter very simple. There is no way to articluate in a single letter the history of the heli-skiing approval process.
AS SIMPLE AS POSSIBLE IS ALWAYS GOOD.

A couple of thoughts:

1) Should we include a map A MAP TELLS A THOUSAND WORDS, I MAY HAVE ONE FROM A PREVIOUS STAFF REPORT- IT SHOWS FLIGHT PATH AND LZ.
2) Should we include a spot for name and address of homeowner YOU MAY INCLUDE A SPOT, BUT IT MAY BE PREFERABLE TO NOT REQUIRE A NAME. HOWEVER, IF A BUNCH OF SURVEYS ARE RETURNED
3) Do we include a copy of the TUP from last fall I'LL SEE ABOUT PUTTING IT ON OUR WEBSITE AND YOU CAN SAY SOMETHING
4) Does it matter if they own a home or lot (part-time or full-time resident) ALL OWNERS SHOULD GET THE MAIL OUT...YOU MIGHT WANT TO HAVE A SURVEY QUESTION....FULL TIME RESIDENT, UNBUILT LOT OWNER, PART TIME RESIDENT, SOMETHING LIKE THAT..
5) If we get these out in the mail middle of next week, what is a realistic deadline to have tham returned 3 WEEKS TO 1 MONTH

Thanks for taking the time to review this survery.

Jeff

Sincerely,

Jeff Naylor
General Manager
10 Warm Creek Lane
Victor, ID 83455
P: 208.787.7230 • F: 208.787.7889 • TF: 877.787.8757
C: 208-709-4409
www.tetonspringslodge.com

What our guests say about us on: Trip Advisor

Curt Moore

From: Pamela Colby
Sent: Friday, April 13, 2012 10:18 AM
To: Chuck Iossi; Stacey Frisk
Cc: Diane Murphy; Lucian Carter; Tina Culman; Curt Moore
Subject: [LIKELY_SPAM]Re: Helicopter Use in Teton Springs- Update

That would would for us Chuck. Thanks!

From: Chuck Iossi
To: Stacey Frisk
Cc: Diane Murphy Pamela Colby- Carter < ; Lucian Carter
; Tina Culman <
Sent: Wednesday, April 11, 2012 1:43 PM
Subject: Re: Helicopter Use in Teton Springs- Update

Hi Stacey,

I'm glad the nest was found. As you know, I've spotted the eagles several times and sent photos. Having a helicopter flying over residential property is unsuitable under any conditions, in my opinion. Teton Springs was not developed for this type of activity.

Tina and I are out of state so we can't report on the flight operations. One of my concerns is the fact the helicopter flies south to the national forest, then flies east along the TS/forest border rather than continuing south.

I'll return the end of April and will be happy to host a meeting at our house the week of April 30th (not Friday the 4th). Does this suit?

Best,

Chuck

Chuck Iossi

Teton Springs Golf and Casting Club
Victor, ID 83455

On Apr 9, 2012, at 3:53 PM, Stacey Frisk wrote:

We were finally able to get the original Federal Fish & Wildlife agent up here to confirm the location of the eagle's nest. His initial report to the County Commissioners had stated that there was no evidence of nesting, so we will be working for an official retraction.

The nest is almost exactly a half mile away from the 'official' flight path— this just meets the minimum requirement, but leaves almost no room for deviation from the recorded path. In fact, the nest has 'failed' the last two years, meaning that the

pair laid eggs that did not survive. I'm working with Rob Cavellaro at our state Fish & Game to put together a map for better monitoring of the flight path.

Has High Mountain Heli ceased operations for the winter? Citizen feedback on the flightpath will be very important and it would be helpful to have some eyes in Teton Springs.

Based on the impact of operations this winter, I think a good case can be made for the County Commissioners regarding the unsuitability of this site. High Mountain Heli will be applying to have their 1 year Temporary Use Permit converted into an ongoing Conditional Use Permit. Several of you have indicated an interest in meeting/hosting a session to organize feedback for that hearing. I know scheduling is very tight for all of you, but we are happy to work with you to find the best time to get together.

Best,

Stacey Frisk
Executive Director
Valley Advocates for Responsible Development (VARD)
<FBB6C755-2D6F-4685-BF14-AD7B14969F1A[55].png>

From: Diane Murphy <
Date: Fri, 16 Mar 2012 16:04:50 -0600
To: Stacey Frisk <
Cc: <[illegible]>, <[illegible]>, <[illegible]com>, <[illegible]om>, <cmoore@co.teton.id.us>
Subject: Helicopter Use in Teton Springs

Hi, Stacey -

I appreciate your continued involvement in this important issue. Although the High Mountain Heli-Skiing operation got off to a slow start due to less than normal snow pack in the month of December, it has been quite busy until the past couple of days.

With respect to the pair of eagles that resides in the National forest, I'm not sure anyone has been able to locate the nest yet, given the density of the trees. However, many of us have seen and continue to see the eagles fly into the southern edge of the forest, directly adjacent to the border of Teton Springs and in the vicinity of the helicopter's flight path.

I do have pictures of them roosting on the power poles to the west of our property, as they frequently perch there. I do not have any conclusive proof of this, but it does seem that they are on the poles on the days the helicopter is making flights. As I wrote you previously, my research about the nesting habits of eagles indicates that humans can definitely disturb them while they are mating/on their nest. Does this cause them to leave their nest in the forest and fly to the power poles? It certainly seems so, but, again, I do not have absolute proof.

Regarding the flight path of the helicopter, as noted by Mr. Moore in his last email, there does not appear to be a definitive route. When I have observed the helicopter flying, it does not seem to ever fly in the same path at all. That, combined with the inability to locate the nest, would make it difficult for anyone to maintain that the helicopter is not flying anywhere near the eagle's nest.

I have not received a copy of the conditions placed on the heli-skiing operator. I also have not been surveyed by the HOA's in Teton Springs regarding the helicopter operation.

Pamela Carter's letter to Mr. Moore very succinctly summarized the reasons for not allowing commercial helicopter flights to operate in Teton Springs. In fact, I cannot imagine why any residents, in any residential subdivision/development in Teton Valley, would want a commercial helicopter operation. The Driggs airport does, indeed, seem like the logical location for that activity.

I would be happy to meet, but will be out-of-town from 3/26-4/6. If there is any additional information you would like from me, please let me know. Again, I appreciate your help and involvement on this issue.

Warmly,

Diane Murphy

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Curt Moore

From: Pamela Colby
Sent: Saturday, March 10, 2012 10:04 AM
To: Curt Moore
Subject: Re: Helicopter pollution in Teton Springs

Thank you Curt. I trust you are forwarding these to the Board?

From: Curt Moore <cmoore@co.teton.id.us>
To: 'Pamela Colby' · . n>
Sent: Friday, March 9, 2012 2:08 PM
Subject: RE: Helicopter pollution in Teton Springs

Pamela & Lucian,
Thanks for providing us with your first hand observations of the helicopter use in Teton Springs. Feel free to call me and there is a chance that I could make it down to Teton Springs and get a first-hand since of the impacts. The heli-season temporary use permit was granted until the end of March- this year only and I will save your emails to the file and it will be part of the considerations about the temporary use permit.
Regards,

Curt Moore
Planner
150 Courthouse Drive, Room 107
Driggs, Idaho 83422
Ph: 208-354-2593 ext 200
cmoore@co.teton.id.us

From: Pamela Colby [·
Sent: Friday, March 09, 2012 1:18 PM
To: Chuck Iossi; Curt Moore
Cc: anna(; Lucian Carter; Diane Murphy; Tina Culman
Subject: Re: Helicopter pollution in Teton Springs

Dear Mr. Moore,

There is plenty of evidence of unacceptable levels of exhaust resulting from the commercial flight operation at Teton Springs. As previously reported, the exhaust fumes burn our lungs and do not readily clear the area, as there is little to no breeze on the days that are optimal for the flights. At the public hearing before the Planning Commission, the operator stated that his helicopter burned nearly exhaust free. We knew for the prior year's illegal operation at Teton Springs, that this was simply not true. Further, the helicopter most decidedly does not sound like "an egg beater" as suggested by the operator.

Given that $8 million in federal stimulus money that was recently invested in the Driggs airport, it remains a mystery that this intensive use has been conditionally approved by the County Board of Commissioners. It is worth noting that the number of flights approved for our quiet residential neighborhood significantly exceeds <u>all</u> flights from the Driggs airport during the same time frame last year.

We understand that there are often competing and conflicting interests at play when considering land-use decisions in the context of the the goals of the General Plan. However, we continue to feel very strongly that

(1) the adverse environmental issues noted above, (2) support of the regional airport and (3) preserving the quiet and peaceful enjoyment of our neighborhood significantly outweigh the limited economic benefit of this activity at Teton Springs. Again, we are not taking a position on whether this activity is appropriate for Teton County generally, rather, we believe that this is not the appropriate location for said.

Sincerely,

Pamela and Lucian Carter

From: Chuck Iossi <
>
To: cmoore@co.teton.id.us
Cc: anna
; Pamela Colby- Carter
>; Lucian Carter
<
>; Diane Murphy <
; Tina Culman <
>
Sent: Friday, March 9, 2012 11:41 AM
Subject: Helicopter pollution in Teton Springs

Dear Mr Moore,

I'm writing to express my dismay at the smell of jet fuel that permeates my homesite in Teton Springs this morning (specifically about 10:30am) following two or more round trip flights by the helicopter operating under the Conditional Use Permit. As you recall, this was a concern expressed during the hearings for the CUP and other Teton Springs residents have made this observation.

Thank you for including this complaint with the file when the use permit is subject to review.

Sincerely,

Chuck

Chuck Iossi

Teton Springs Golf and Casting Club
Victor, ID 83455

P.S. I've attached a photo of a bald eagle I took in Teton Springs property about 1/2 mile from the helipad on March 3, 2012. The location is north of the cabin residence 39 Blackfoot Trail.

DSC02920

Curt Moore

From: Pamela Colby |
Sent: Friday, March 09, 2012 1:18 PM
To: Chuck Iossi; Curt Moore
Cc: anna; Lucian Carter; Diane Murphy; Tina Culman
Subject: Re: Helicopter pollution in Teton Springs

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Sincerely,

Pamela and Lucian Carter

From: Chuck Iossi <.com>
To: cmoore@co.teton.id.us
Cc: anna Pamela Colby- Carter Lucian Carter
< Diane Murphy < >; Tina Culman <
Sent: Friday, March 9, 2012 11:41 AM
Subject: Helicopter pollution in Teton Springs

Dear Mr Moore,

I'm writing to express my dismay at the smell of jet fuel that permeates my homesite in Teton Springs this morning (specifically about 10:30am) following two or more round trip flights by the helicopter operating under the Conditional Use Permit. As you recall, this was a concern expressed during the hearings for the CUP and other Teton Springs residents have made this observation.

Thank you for including this complaint with the file when the use permit is subject to review.

Sincerely,

Chuck Iossi

Teton Springs Golf and Casting Club
Victor, ID 83455

P.S. I've attached a photo of a bald eagle I took in Teton Springs property about 1/2 mile from the helipad on March 3, 2012. The location is north of the cabin residence 39 Blackfoot Trail.

Curt Moore

From: Chuck Iossi [
Sent: Wednesday, April 11, 2012 1:43 PM
To: Stacey Frisk
Cc: Diane Murphy; Pamela Colby- Carter; Lucian Carter; Tina Culman; Curt Moore
Subject: Re: Helicopter Use in Teton Springs- Update

Hi Stacey,

I'm glad the nest was found. As you know, I've spotted the eagles several times and sent photos. Having a helicopter flying over residential property is unsuitable under any conditions, in my opinion. Teton Springs was not developed for this type of activity.

Tina and I are out of state so we can't report on the flight operations. One of my concerns is the fact the helicopter flies south to the national forest, then flies east along the TS/forest border rather than continuing south.

I'll return the end of April and will be happy to host a meeting at our house the week of April 30th (not Friday the 4th). Does this suit?

Best,

Chuck

On Apr 9, 2012, at 3:53 PM, Stacey Frisk wrote:

We were finally able to get the original Federal Fish & Wildlife agent up here to confirm the location of the eagle's nest. His initial report to the County Commissioners had stated that there was no evidence of nesting, so we will be working for an official retraction.

The nest is almost exactly a half mile away from the 'official' flight path— this just meets the minimum requirement, but leaves almost no room for deviation from the recorded path. In fact, the nest has 'failed' the last two years, meaning that the pair laid eggs that did not survive. I'm working with Rob Cavellaro at our state Fish & Game to put together a map for better monitoring of the flight path.

Has High Mountain Heli ceased operations for the winter? Citizen feedback on the flightpath will be very important and it would be helpful to have some eyes in Teton Springs.

Based on the impact of operations this winter, I think a good case can be made for the County Commissioners regarding the unsuitability of this site. High Mountain Heli will be applying to have their 1 year Temporary Use Permit converted into an ongoing Conditional Use Permit. Several of you have indicated an interest in meeting/hosting a session to organize feedback

for that hearing. I know scheduling is very tight for all of you, but we are happy to work with you to find the best time to get together.

Best,

Stacey Frisk
Executive Director
Valley Advocates for Responsible Development (VARD)

From: Diane Murphy
Date: Fri, 16 Mar 2012 16:04:50 -0600
To: Stacey Frisk
Cc: <

Subject: Helicopter Use in Teton Springs

Hi, Stacey -

I appreciate your continued involvement in this important issue. Although the High Mountain Heli-Skiing operation got off to a slow start due to less than normal snow pack in the month of December, it has been quite busy until the past couple of days.

With respect to the pair of eagles that resides in the National forest, I'm not sure anyone has been able to locate the nest yet, given the density of the trees. However, many of us have seen and continue to see the eagles fly into the southern edge of the forest, directly adjacent to the border of Teton Springs and in the vicinity of the helicopter's flight path.

I do have pictures of them roosting on the power poles to the west of our property, as they frequently perch there. I do not have any conclusive proof of this, but it does seem that they are on the poles on the days the helicopter is making flights. As I wrote you previously, my research about the nesting habits of eagles indicates that humans can definitely disturb them while they are mating/on their nest. Does this cause them to leave their nest in the forest and fly to the power poles? It certainly seems so, but, again, I do not have absolute proof.

Regarding the flight path of the helicopter, as noted by Mr. Moore in his last email, there does not appear to be a definitive route. When I have observed the helicopter flying, it does not seem to ever fly in the same path at all. That, combined with the inability to locate the nest, would make it difficult for anyone to maintain that the helicopter is not flying anywhere near the eagle's nest.

I have not received a copy of the conditions placed on the heli-skiing operator. I also have not been surveyed by the HOA's in Teton Springs regarding the helicopter operation.

Pamela Carter's letter to Mr. Moore very succinctly summarized the reasons for not allowing commercial helicopter flights to operate in Teton Springs. In fact, I cannot imagine why any residents, in any residential subdivision/development in Teton Valley, would want a commercial helicopter operation. The Driggs airport does, indeed, seem like the logical location for that activity.

I would be happy to meet, but will be out-of-town from 3/26-4/6. If there is any additional information you would like from me, please let me know. Again, I appreciate your help and involvement on this issue.

Warmly,

Diane Murphy

<FBB6C755-2D6F-4685-BF14-AD7B14969F1A[55].png>

Curt Moore

From: Chuck Iossi
Sent: Friday, March 09, 2012 11:42 AM
To: Curt Moore
Cc: anna ; Pamela Colby- Carter; Lucian Carter; Diane Murphy; Tina Culman
Subject: Helicopter pollution in Teton Springs

Dear Mr Moore,

I'm writing to express my dismay at the smell of jet fuel that permeates my homesite in Teton Springs this morning (specifically about 10:30am) following two or more round trip flights by the helicopter operating under the Conditional Use Permit. As you recall, this was a concern expressed during the hearings for the CUP and other Teton Springs residents have made this observation.

Thank you for including this complaint with the file when the use permit is subject to review.

Sincerely,

Chuck

P.S. I've attached a photo of a bald eagle I took in Teton Springs property about 1/2 mile from the helipad on March 3, 2012. The location is north of the cabin residence 39 Blackfoot Trail.

DSC02920

Curt Moore

From: Diane Murphy
Sent: Friday, March 16, 2012 4:05 PM
To:
Cc: [illegible] ; Curt Moore
Subject: Helicopter Use in Teton Springs

Hi, Stacey -

I appreciate your continued involvement in this important issue. Although the High Mountain Heli-Skiing operation got off to a slow start due to less than normal snow pack in the month of December, it has been quite busy until the past couple of days.

With respect to the pair of eagles that resides in the National forest, I'm not sure anyone has been able to locate the nest yet, given the density of the trees. However, many of us have seen and continue to see the eagles fly into the southern edge of the forest, directly adjacent to the border of Teton Springs and in the vicinity of the helicopter's flight path.

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I would be happy to meet, but will be out-of-town from 3/26-4/6. If there is any additional information you would like from me, please let me know. Again, I appreciate your help and involvement on this issue.

Warmly,

Diane Murphy

Curt Moore

From: Diane Murphy [
Sent: Saturday, February 18, 2012 9:43 AM
To: Curt Moore; anna(
Subject: American Bald Eagle - Nesting & Young

http://www.baldeagleinfo.com/eagle/eagle4.html

Sent from my iPad

Curt Moore

From: Diane Murphy
Sent: Saturday, February 18, 2012 9:42 AM
To: Curt Moore
Cc: anna(
Subject: Helicopter Use in Teton Springs

Dear Mr. Moore -

I appreciate your timely response to my previous email. You asked me to write if I had additional concerns, and I do.

We have a pair of nesting bald eagles that live in the National forest at the southern edge of Teton Springs. They have lived here for at least as long as we have. In addition to seeing them fly up into the trees and to the nest, they are seen frequently by many of our residents throughout the year throughout our development.

As an added bonus for K.C. and me, they like to perch on the power poles directly behind our house, which is in the southwestern corner of Teton Springs. These power poles are adjacent to Pole Canyon road.

We normally see them on the poles more frequently in the summer and fall, as they look for rodents from their perch. However, since the helicopters have increased their flights during the past couple of weeks, the eagles have been on the power poles daily. (Due to the lack of snow earlier this winter, helicopter skiing - and flying - has just begun in earnest).

I am forwarding information I reviewed from a web site about bald eagles and their nesting habits. When you review it, you will note that bald eagles mate for life, use the same nest over and over, keep the same territory - about one to two square miles - and that human disturbances affect their ability to nest. Further, you will note that in the Mountain West the bald eagles typically mate between January and March, which is the prime time for the helicopter to fly directly over their nest. You will also find that even though the number of bald eagles in the U.S. has increased, they still are limited and counted.

This seems to be another compelling reason to prohibit commercial helicopter use in Teton Springs. As I have previously stated, the helicopter flies directly south, over the National forest. It is thus flying over the eagles' nest and territory during a critical time period.

Again, I appreciate you taking the time to carefully consider the impact of commercial helicopter use in Teton Springs, which is directly adjacent to the National forest.

Sincerely,

Diane Murphy

Curt Moore

From:
Sent: Wednesday, September 28, 2011 4:06 PM
To: Curt Moore
Subject: Teton Springs Commercial Helicopter Application

This email serves to express our strong oppostition to the proposed modification of the PUD for Teton Springs to permit regular commercial helicopter flights for skiing from Lot 8C in Teton Springs. The additional noise pollution that will be created by the helicopters will have severe negative impact on the quality of life of nearby residents, causing regular disruptions to their daily activities and further contribute to the decline in property values which are already very depressed. Given the proximity of a commecial airport facility, it is not reasonable or appropriate to inflict such significant monetary and non monetary costs on those who purchased their homes or residential lots on the basis of promises that the development, with its specific PUD zoning and as a covenant protected community would assure its residents of an environment harmonious with its natural surroundings in which they would be able to "listen to the whispers of nearby waters."

Those who have written in support of the proposed use argue that without the change in zoning, there will be a loss of jobs or revenue to the area. However, the prior use of the helicopter pad for the commercial flights was not permitted and, accordingly,any reliance on the past unlawful activities to justify why they should continue would only serve to reward the prior wrongdoing. Further, these arguments do not recognize that there are other locations from which the commercial flights nd related collateral commercial activities could be conducted.

In addition to the loud noises created by helicopters, which will constitute a nuisance, be offensive to nearby residents and disturb wildlife, there will be additional pollution from the related automobile traffic.

Thespeculative economic benefits from the flights, should not outweigh the legitimate interests of the residents of the community, particularly when the past operations were illegal and there are alternative locations that have not been adequately considered.

The limited number of complaints to the past operations should not be considered a silent endorsement of the proposed change in use. We, as have others, bought our lot with the expectation that we would be able to build a home in a community that honored and respected its residents and nature. The fact that recent ecomonic events have delayed our plans does not mean that our reasonable goals and the promises made should be abrogated or that we care less about the community. Had we been aware of the prior illegal flights we would have vigorously protested them. We regret that due to economic circumstances we are not able to attend the meeting in person. We very much hope that the arguments made by the few who claim that the denial of the application will have an adverse financial impact on them will not outweigh the severe cumulative adverse effects, both financial and otherwise that will be inflicted on the community (including the value of properties for tax purposes) if the application is approved.

We ask that each of you honestly reflects on how you would be affected if commercial helicopter operations were to be regularly conducted in the immediated vicinity of your home and that in recognition of the negative effects you deny the application that would permit such operations to be inflicted on those in the community whom you should both serve and protect.

Sincerely,
Martha and Frank Nachman (Nachman Family Trust)
Block 8 Lot 10

Curt Moore

From: Pamela Colby
Sent: Tuesday, October 11, 2011 1:23 PM
To: Curt Moore
Subject: Found it under the new tab. Thanks. Please make statement at hearing tonight?

Curt Moore

From: Pamela Colby
Sent: Tuesday, October 11, 2011 1:02 PM
To: Curt Moore
Subject: Fw: Helipad Letter of Support

Curt,

I'm uncertain as to why the below noted communication has not been noted in the record.

Neither the HOA nor any of the TS sub-associations have taken up the subject of the heli operation. Tracey Everett was speaking as an individual, not for the HOA, and has since retracted her support for the project - as noted below. This retraction has not been posted on the County website nor was this included within the new staff report. You have stated that her support letter is the best gauge of opinion for Teton Springs, which I assure you is not true. Please note this in your presentation of the staff report tonight...if you would not mind. Thanks!

Pamela Carter

----- Forwarded Message -----
From: Tracy Everett
To: cmoore@co.teton.id.us
Cc: Jon Wilson <[illegible]>; Chuck Iossi [illegible]m>; Tina Korpi <[illegible]>; DeNesha <[illegible]>; Pamela Colby <[illegible]
Sent: Thursday, September 29, 2011 3:01 PM
Subject: Re: Helipad Letter of Support

Hello Curt,

In regards to my letter of support on August 30th, 2011 for the Helipad located in Teton Springs, I would like to clarify that it reflected my opinion and my opinion only. It was by **no** means any formal statement from the Teton Springs Mountain Meadows Home Owners Association.

At this time, I would like to say that the Mountain Meadows HOA chooses to **not** take a formal position in this heated debate.

And due to the changing status of Teton Spring's application, I would like to retract my personal letter of support until I feel more educated on the particulars of the new application.

Thank you for your time.

Kindly,
Tracy

On Tue, Aug 30, 2011 at 9:53 AM, Tracy Everett <[illegible]> wrote:
Hi Curt,

I am the President of the Teton Springs Mountain Meadows HOA subassociation and I would like to voice my support of the helipad located in Teton Springs. I think it is the right step to encourage business at the Lodge

and perhaps more property sales.

Kindly,
Tracy

Curt Moore

From: Pamela Colby
Sent: Monday, September 12, 2011 9:22 AM
To: Curt Moore
Subject: Teton Springs DA Amendment and CUP

Good morning Curt,

Thank you again for your patient and thoughtful responses to my inquiries last week.

I've taken some time to consider the process for amending the subject Development Agreement (DA) and consideration of a Conditional Use Permit (CUP) for a commercial flight operation at the center of our residential community.

I would ask that staff consider recommending that the hearing/approval process be bifurcated: DA amendment and then consideration of a specific CUP. This would allow the land-use discussion to take place without the distraction of the "personalities."

Teton Springs (TS) has been operating this use for more than one season and, I believe, with the full understanding that it was not consistent with the DA. If necessary, I will be the "plaintiff" with standing who challenges this activity. I am not certain what remedies might be available for a violation of this nature, but I can certainly find out what other communities have done. In saying this, I would be satisfied with requiring that TS be the applicant for the DA amendment. I would require that the burden of proof be on TS to explain how expanded helicopter operations can be justified. The heli-pad was originally approved only with significant limitations as to its use. Considerable planning expertise was employed to prepare the development plans for TS. I would suggest that a modification of this nature warrants professional attention - paid for by TS.

Once an application is received, I would request a comprehensive staff analysis of commercial flight operation adjacent to residential. The environmental impact analysis would include considerations such as safe fuel storage, air quality, safety considerations, traffic generation, and so forth. Specific parameters for a proposed operation should be outlined by the applicant, TS. Other communities have well-established processes for analyzing commercial flight operations. The wheel not be recreated here. Because the proposed use would be located immediately adjacent to dense residential, a comprehensive analysis warranted. We owe this to current TS residents, particularly the full-time resident, as well as to those who will come to occupy the 60% of this property which remains undeveloped.

If the Planning Commission determines that they can support such a use and approve the amendment to the DA, only then should a specific CUP be considered. This would help the Commission stay clear of the pressure from "interested" parties who should have no impact on the planning question.

I respectfully submit these suggestions for consideration by staff and the Planning Commission.

Pamela Carter

Curt Moore

From: Pamela Colby [
Sent: Friday, September 09, 2011 3:49 PM
To: Curt Moore
Subject: PUBLIC HEARING: Teton Springs Golf & Casting Club CUP Application

Curt:

Thank you for your time and complete responses to my inquiries regarding the upcoming public hearing to consider the CUP request that, if approved, would allow High Mountain Heli-Skiing (HMHS) to operate a commercial flight service within 300' of our home.

We respectfully request that Planning Commission consideration of this item be continued.

The Public Notice for this hearing indicated that a CUP would be considered to allow HMHS to operate in Teton Springs (TS). What was not noted is that this action will require an amendment to the Development Agreement (DA) to greatly expanded activities beyond what is currently allowed. Upon review of the Public Notice, my understanding was that the CUP being considered would be consistent with the DA, which is not the case. The operations that occurred last winter would clearly not be allowed under the existing DA. Had the Public Notice for this item included mention of modification of the DA, we would have been alarmed and taken the time to research this project thoroughly and prepared detailed comments. We believe this is true for many of my neighbors as well. In speaking with you, we believe that this was not an attempt to keep important information from residents of TS or to "end-run" the review process. At this juncture, however, there is insufficient time to analyze the proposed amendment to the DA and prepare a complete response.

In addition, we understand that there are procedural issues that require the city of Victor to review the subject application prior to Planning Commission consideration - as TS is located within their sphere of influence. We respectfully request that this important aspect of the application review process not be ignored. It would present the opportunity for legal challenges, with the associated costs, which can be avoided by not skipping this step.

On a personal note, we purchased our home in TS with the full understanding that the development included a heli-pad for "emergency" an "alternate" transportation. We accepted this and welcomed this pre-existing condition. This is very different from living immediately adjacent to a commercial flight operation. The noise, additional traffic and air pollution associated with this type of land-use is entirely unacceptable. We would have chosen to buy elsewhere. The staff report did not comment on the significant degradation of air quality that results from this use. This will be our third year as full-time residents at Teton Springs. We have experienced first-hand the settling of jet fuel-rich, carcinogenic exhaust that lingers in our end of the valley when this business is operating. Our lungs burn and our eyes water. We live in Teton Valley to avoid this very poor quality of life and exposure to health diminishing factors. Given time to analyze this proposed

CUP, we are certain that there are other considerations of an environmental nature that should be considered for a flight operation immediately adjacent to residential property.

We are not opposed to High Mountain Heli-Skiing and their effort to find a suitable location for their business. To the contrary. My husband and I both ski and would love to enjoy the fresh powder accessed by this service. Further, we believe that jobs and economic development activities are much needed in the valley. The question is: where does this business belong? Does this intensive commercial activity belong immediately adjacent to homes? We appreciate that we have a Planning Commission in place to weigh these very considerations.

Thank you for your consideration of this request.

Pamela and Lucian Carter

Continued on next page...

From: Daniel Rubin
Sent: Thursday, August 30, 2012 11:52 AM
To: Angie Rutherford
Subject: September 13 hearing re: High Mountain Heli-Skiing operation at Teton Springs

We are sending this email in whole hearted support of continuing the heli-skiing operation at Teton Springs. Heli – Skiing brings visitors and revenue to Victor. It brings prestige to the Idaho side of the Tetons. The helicopter operation in no way negatively impacts any residents of Teton Springs or Victor. In fact, the sight of the helicopter rising into a clear blue winter sky adds to the ambience.

Daniel Rubin and Eileen Prusek

Victor, ID

From: Diane Murphy
Date: September 3, 2012 11:49:21 PM MDT
To: Curt Moore; Angie Rutherford; Kathy Rinaldi; Bob Benedict; Kelly Park
Cc: Stacey Frisk; Anna Trentadue
Subject: Helicopter Use in Teton Springs

Hello All -

I have previously written to Mr. Moore regarding my concerns about commercial helicopter operations in our residential neighborhood. However, it is my understanding that a hearing on this issue will be held on September 13th. Since I have had plans for several months to be out of the state on that date, I would like my opinions on this issue to be on record and, hopefully, to have some impact on your decision.

When my husband and I purchased our home at 8 Winger Circle in Teton Springs in July, 2009, we were unaware of a heli-skiing operation conducted in our subdivision. When such operations commenced during the winter months of 2010 and 2011, they were infrequent and, we were told, temporary.

We moved to this quiet, non-polluted, rural community after spending over 20 years in Boise, Idaho, where there was considerable noise and air pollution and a lack of wildlife. We were impressed that none of the homes in our development could have wood-burning fireplaces in order to cut down on air pollution. We were also impressed with the quiet walking trails and pairs of nesting eagles that reside in Teton Springs.

Last winter the County Commissioners approved a temporary use permit for the heli-skiing operation in Teton Springs. Although I realize the winter of 2012 had a relatively small number of flights due to the late ski season and the fact that the Headwaters Grille was closed from October-March, the impact of those flights had a significant impact on our use and enjoyment of our neighborhood as well as on the nesting eagles.

As I wrote Mr. Moore, each time the helicopter flew the smell of Jet-A permeated the entire neighborhood. This was especially true when we had inversions - a common occurrence during the winter months - while I was attempting to snowshoe or walk on the trails within Teton Springs. In addition, the noise was loud and annoying - something unnatural to a rural community bounded by a National Forest. This pollution is one of the main reasons we left the city of Boise.

Furthermore, each day the helicopter made several trips to deliver skiers to their destination, it flew directly over the National Forest where at least one pair of eagles has been documented to have their nest. Some proponents of the helicopter operation have insisted that they fly in a designated flight path and stay within the requisite one-half mile distance from the located nest. This is simply not true. I have witnessed the helicopter flying in many different paths and directions. In fact, it has even flown over our home, which is in the southwestern corner of Teton Springs and certainly not within the designated flight path.

I also noted that on the days the helicopter flew, the eagles would leave their nest and perch on the power poles directly behind our home. Although they are beautiful to see up close, my research indicates that eagles lay eggs during the same months that the helicopter makes its trips: January-March. It has been noted by Idaho Fish and Game employees that there have been two failed nests in the past two years. Therefore, it is reasonable to conclude that the frequent disruption of the eagles on their nest by the helicopter's flights has resulted in their leaving their nest and their eggs.

It is inconceivable to me that a commercial helicopter operation would be permitted to conduct its operations within any residential community in any part of Teton Valley - Teton Springs or any other neighborhood in our county. The Driggs airport is the logical place for helicopter traffic and the taxpayers have recently paid a considerable amount of money for an upgrade to the airport.

Surely the rights of the residents of Teton Springs - or any other residential development in Teton County - to use and enjoy their rural property in a pollution-free environment outweigh the demands of a hotel to generate some additional income during the winter months. In addition, given the fact that eagles are still considered a protected/endangered species and that it has been documented that a pair have a nest on the southern border of Teton Springs, they deserve protection from having that nest disturbed by frequent helicopter flights within close proximity.

I urge you to deny any future helicopter flights in Teton Springs. Thank you very much for taking the time to review my letter and the opinions contained herein.

Sincerely,

Diane Murphy

From: Lucian Carter
Sent: Monday, September 03, 2012 9:11 PM
To: Dawn Felchle; Angie Rutherford; Angie Rutherford; Kathy Rinaldi; Kelly Park; Bob Benedict; Kathy Spitzer
Subject: Opposition to Continued operation of High Mountain Heli in Teton Springs

September 3, 2012

Honorable Chair and Members of the Board
Board of County Commissioners
Teton County, Idaho
150 Courthouse Drive
Driggs, Idaho 83422

Subject: Application for Amended Development Agreement of Teton Springs

Dear Madam and Sirs:

My wife and I have been full time residents/owners in Teton Springs since June, 2009. During this time, we have enjoyed the peace and tranquility that was afforded to us when we purchased in a community with guarded restrictions. When we purchased our home, we recognized that there was a golf course, a hotel and swimming facility that was open

to members and hotel guests. Knowing that, we had some expectation that power equipment would be in use to groom the golf course, as well as the impact of the Lodge's seasonal guests and members making ingress and egress to and from the community. In saying that, there have been and are currently efforts underway by High Mountain Heli (HMH) and Teton Golf & Casting LLC (TG&C) to destroy our peaceful and guarded lifestyles due to their promotion of a commercial backcountry heli ski business based at the Lodge.

According to the staff report, HMH has proposed a total of 7 round trip flights each day, operating between the hours of 9:00 am to 4:30 pm., with a total of 14 one way trips. Also, the report stipulated that HMH can fly up to 50 days during the proposed season which is December 25 to April 1. Summary: there could be 700 flights generated by approval of this application. Amazingly, this rigorous flight schedule promotes a commercial flight operation out of a private residential area that possibly exceeds the winter activity at the Driggs Airport. These flight numbers can be readily obtained from the FBO and compared to the proposed flights that HMH and TG&C is promoting. Also, the Driggs airport recently received approximately $8 million dollars from the Federal Stimulus program to improve airport operations, develop infrastructure to assist in bringing additional economic growth to Teton County through these improvements.

As residents/owners in Teton Springs, when purchasing our home in June of 2009, we were never informed that such a flight operation was being developed and pursued by HMH and TG&C. We took comfort in the idea that, as in past, the County would continue to enforce the existing Development Agreement. Since then, HMH and TG&C have operated illegally during the winter seasons of 2010 and 2011 without penalty by the County. The 2012 season was not representative of the intensity approved by the County, as only 25% of the possible flights were flown.

Recently, we received a survey from Grand Teton Property Management that asked one question and was extremely vague in definition. The question was more or less; do you approve or disapprove of a Heli Operation? I believe the survey failed to ask additional questions relevant to this commercial operation, thus failing to elicit a meaningful result. The survey failed to define what a Commercial Heli-Operation means in a private residential neighborhood. Do our residents understand that HMH proposes 700 flights and to fly business in from Jackson? Of course they do not.

In addition, I am very concerned about the following well-documented issues:

- Noise Pollution
- Air Pollution
- Impact on wildlife
- Hazardous Materials (fuel truck stored on site)

In closing, I am vehemently opposed to this operation and would support a denial of the Heli-Skiing in the Teton Springs community. I believe this commercial operation should be based out of the Driggs Airport and after all, it is a designated airport.

Sincerely,

Lucian Carter

From: Pamela Colby
Sent: Monday, September 03, 2012 8:20 PM
To: Dawn Felchle; Angie Rutherford; Angie Rutherford; Kathy Rinaldi; Kelly Park; Bob Benedict
Cc: Kathy Spitzer
Subject: Opposition to the continued operation of High Mountain Heli in Teton Springs

September 3, 2012

Honorable Chair and Members of the Board
Board of County Commissioners
Teton County, Idaho
150 Courthouse Drive
Driggs, Idaho 83422

Subject: Application for Amended Development Agreement of Teton Springs

Dear Madam and Sirs:

My Husband and I have lived full-time in Teton Springs since June of 2009. We recently shared a conversation with an elderly gentleman in a new restaurant in Driggs. He said that he had lived in the Valley for more than 30 years. Out of the blue, he shared that he felt that Teton County was at risk of being ruined by poor planning decisions, as his childhood home in San Bernardino had been. Ironically, when my husband and I considered buying in Idaho, I felt the similarity between these two valleys. However, one is spoiled beyond repair and the other remains a reasonably successful balance of agriculture, business, and residential uses and the environment. The subject land-use decision is far more important than just what may happen to our community of Teton Springs. It should be watched carefully by all residents of Teton County. If a new airport, with the potential for considerably more traffic than the existing regional airport in Driggs, can be approved in this quiet neighborhood, what will the County approve next door to your home?

Our decision to buy in a planned residential community was influenced by the protections afforded by strict CC&Rs. We noted that there was an approved heli-pad very close to the home we were considering, but that it was strictly limited to alternated transportation for our community. We knew that an effort to convert this small heli-pad to commercial use had been attempted in the past, but that the County had swiftly shut down the illegal operation. Fast forward to the facts we have encountered to date:

· Since moving to Teton Springs in 2009, we have witnessed two seasons of illegal flight operations out of our otherwise quiet and peaceful neighborhood. The County allowed this illegal use to persist in 2011/12, in spite of complaints from the community.

· We only just received notice of the September 13, 2012 public hearing on August 28, 2012. This allowed only a few days to prepare our comments if they are to be considered as part of the public record. Many Teton Springs and valley residents are on holiday during this time of the year and will return to find insufficient time to prepare comments for the official record.

· County staff did not contact our family or neighbors to secure input for the staff report..

· The staff report contains no meaningful analysis of the prior season's operation and the staff planner has been on vacation during the comment period and unavailable to answer questions about the proposed application.

· No notice of this application and public hearing was provided by the homeowners association.

· As others will discuss in greater detail, the survey conducted by the management company for Teton Springs was flawed. However, it did reveal considerable neighborhood opposition to the application. Unfortunately, there was no defined operation for residents to respond to in the survey. Had it been mentioned that 700 flights over 50 days was being proposed, I am absolutely certain that many who responded as "neutral" would have been opposed.

In summary, there is the appearance that the decision-making process is skewed to benefit the applicant and intended to limit a meaningful dialogue between the community, the applicant and the County Board. Every property owner in Teton County should be on high alert.

As to the application itself, I offer the following comments:

· Considerably more than half of the residential land in the Teton Springs community is still undeveloped. As the bank-owned lots are sold and developed over time, the residential component of this planned community will become the more dominant land-use. Approving a permanent use of this kind, while the community remains largely undeveloped, is inadvisable.

· Approving a use of this kind, permanent or not, without an associated Condition Use Permit is unwise. Without a CUP, the community will have no ongoing protection from the flight operation and the County will have surrendered its only regulatory tool.

· The application makes it clear that our neighborhood will be a regional staging area for High Mountain Heli flights to the forest to the south. The application provides that customers will be flown from Jackson to stage their trips from our neighborhood. How does this benefit our community? Again, if the argument is that Teton Golf & Casting needs this use to be solvent, all flights should be restrict to verified guests of the Lodge only. However, the application appears to be for a new community airport. The question is really: do we need a new community airport and should that airport be sited in the middle of a very dense residential community?

On a very basic level, a commercial flight operation out of this quiet, largely residential community is an extremely incompatible land use. A review of the record shows that this has been at the heart of prohibiting this use since approval of the PUD. Allowing a commercial flight operation of this intensity, based in a residential community with the unprecedented density, is baffling.

· The General Plan provides that the Board should take measures to protect and preserve the quiet and peaceful enjoyment of our neighborhood. The flight operation is extremely noisy and disturbing. I promise you, it does not sound like an "egg beater" as suggested by the operator. This is simply not the truth. One viewing of neighbor Chuck Iossi's video will dispel that myth.

· The General Plan provides that the Board should take measures to protect the environment and wildlife. According to wildlife agents, a Bald Eagle's nest is located within ¼ mile of the approved flight path and this nest has been unsuccessful for the past three consecutive years. This year, the offspring did not survive. Is it a coincidence that this corresponds with the two years of illegal flight operation and this last "test" year? Now, according to the staff report, once the helicopter clears our community's property line, it would now be allowed to deviate from the straight path that was originally approved over the forest property. It doesn't even say where the flights will travel. This could further impact the Bald Eagle nest and many more residents who live adjacent to and near the proposed unregulated, undefined flight path. Who really knows?

· The exhaust and noise are simply not as represented by the applicant. The lung burning, jet fuel rich exhaust that lingers at our end of the valley is not "mostly water vapors" as suggested by the operator. Again, this is simply not the truth. Numerous residents have experienced this first-hand and reported this to County staff. Further, since only 25% of the allowed flights were conducted, the full impact of the proposed operation is unknown and cannot be good.

· Homes in Teton Springs are not even allowed wood-burning fire places because they would adversely impact air quality at this end of the valley. We make this sacrifice to preserve air quality in our community and yet we are being asked to accept jet fuel rich exhaust for an undefined and extremely limited economic benefit to Teton County.

· The General Plan provides that the Board take measures to support the local airport. The Driggs airport recently received nearly $8 million in Federal Stimulus Funds to improve the facility. Last year, a review of the flight logs from the Driggs airport showed that our "neighborhood airport" could have had exponentially more flights during the winter than the Driggs airport reported. Again, the Driggs Airport is the back-up location cited by the operator and this is where a commercial flight operation belongs.

· The General Plan provides that the Board promote economic development. However, this is not done in a vacuum. Rather, this goal is to be balanced with and carefully considered in the context of other impacts of any proposed use. Because the operator has noted that the back-up location for the heli-ski operation is the Driggs airport, the argument that there will be an economic loss to the valley if the application is not approved is not a legitimate one. The question is rightly focused on the economic benefit to Teton Golf & Casting alone. Because the commercial flight operation poses so many negative affects to our community, the applicant should be required to clearly articulate the benefit. Much as we found inaccurate flight logs maintained by the operator, the community should have the chance to analyze and verify the economic data from Teton Golf & Casting.

· Only 25% of the allowed flights were flow during the 2011/12 season. The community has had a mere taste of the noise and pollution that this intensive commercial use creates. However, the applicant has applied more flights and extended hours. How can this be? My husband is a law enforcement officer who often works well into the early morning hours. The proposed earlier start time would impact his ability to get enough sleep.

On behalf of my family and our neighbors who opposed the subject application, I respectfully ask for your support in restoring balance to the land-use decision-making process. Please carefully weigh and balance the goals and objectives articulated in the General Plan. We suggest that the very limited benefit of this application is far outweighed by the negative impacts to our environment and community. Two illegal seasons of operation and one unsuccessful season are not enough to suggest that this "train is on the tracks" and must be approved. Please vote "no" when considering the proposed Amendment to the Development Agreement for Teton Springs.

Sincerely,

Pamela Carter

From: Julie Whitlock
Sent: Monday, September 03, 2012 5:10 PM
To: Angie Rutherford
Subject: High Mountain Heli-Skiing

We are full time residents of Teton Springs (the first to be exact) and we are in favor of the skiing operation.

Joe and Julie Whitlock
Victor, ID

From: Rush Jenkins
Sent: Monday, September 03, 2012 1:44 PM
To: Angie Rutherford
Cc: Klaus Baer
Subject: Teton Springs Helisking Operation

Hi Angie,

Klaus and I wanted to email you regarding the Helisking Operation that is currently proposed for renewal and expansion. As residents of Teton Springs (Mountain Meadows) we are opposed to extending the permit to the Helisking Operation for the following reasons:

1 . **Noise and Pollution:** Living as close as we do to the landing and taking off location has proven to be very noisy. It is of great concern that if this permit is approved they could fly 3 times the amount they flew last Winter, increasing noise and pollution within Teton Springs.

2. **Bald Eagle Nest:** We understand there has been a bald eagle nest Southwest of the helipad site and that the nest has failed to produce eaglets in the last 3 years which is possibly due to the helicopter business. This is of great concern as one of the reasons we moved to Teton Springs was for the natural beauty and wildlife one sees throughout the year. I for one and completely against a business the discourages wildlife from living in Teton Springs, especially fowl. If indeed the helicopter operation is responsible for the lack of the eaglets hatching then it should be shut down. Conclusive evidence is required before Teton County makes a decision on granting an extension to this permit..

3. **No further review:** This last issue is of equally great concern. Teton Springs is only 25% built out. Multiple empty lots near the helipad have yet to build out. Future homeowners should not be put in a position where they don't have a say in the operation. With the current number of complaints from Teton Springs Residence it will stand to reason that many future residence will have equal negative reaction to this business. If you approve a permit it should be up for renewal every year as future residential building occurs.

4. **Expansion of Driggs Airport**: It is the feeling of many residence of Teton Springs that the Heliskiing Operation should be moved to Driggs. The airport expansion has cost tax payers several millions of dollars and all flights, including Heliskling should be required to use that airport, not residential communities.

Thank for you time and consideration regarding this use permit.

Best Regards,

Rush Jenkins

From: Chuck Iossi
Sent: Monday, September 03, 2012 10:26 AM
To: Dawn Felchle; Angie Rutherford; Angie Rutherford; Kathy Rinaldi; Kelly Park; Bob Benedict
Cc: Kathy Spitzer
Subject: Opposition to the continued operation of High Mountain Heli in Teton Springs

Dear Public Officials of Teton County ID,

The purpose of my email is to express strong opposition to the continued operation of High Mountain Heli in Teton Springs. As a full time resident/owner in Teton Springs, there are multiple reasons to reject the application based on the experience of the conditional use permit December, 2011 through March, 2012.

1. Noise pollution
I have been subjected to the disruptive noise of a commercial air operation 4/10 mile from my home. Please see the video I recorded from my back deck on March 10, 2012. This noise level is obtrusive and could occur 14 times a day for 45 days!

While it is difficult to follow the flight path, the video documents the flight to the Teton Springs and National Forest border, then east and south along the Teton Springs property line and not due south as prescribed by the use permit. When I asked the owner of High Mountain why they didn't follow the prescribed flight path, he answered "it was a new pilot"!

http://www.youtube.com/watch?v=7fFO3CGN020

2. Air pollution
Multiple Teton Springs residents (including my wife and I) have filed written complaints about the jet fuel smell accumulating in our residential neighborhood during days of flight operations. Many of our neighbors are not resident in the winter, and did not have personal experience with this health hazard. The same is true of the noise pollution described above.

3. Hazardous Materials
A jet fuel truck sits on site without the security/restricted access of a designated commercial airport (e.g. Driggs). How can this hazard be consistent with a Teton County residential neighborhood and high density hotel facility?

4. Impact on wildlife
It's my understanding a separate report from Idaho Fish and Game will show a potential cause and effect with the heli-ski operation and non-reproducing eagles nesting in Teton Springs. I took this photo March 3, 2012 showing a bald eagle roosting in the center of the frame with the Teton Springs condominium building in the background.

5. Use of Existing Infrastructure
Why should the County permit flight operations in Teton Springs that could exceed the amount of air traffic at the Driggs Airport? The Driggs Airport has been the beneficiary of a multimillion dollar Federal improvement plan. Why would permanent permission for a maximum of 560 flights over four months next to a high density hotel building make sense?

By granting the Conditional Use Permit last year, the quality of life in Teton Springs was sacrificed for the perceived "significant" economic impact of heli-skiing. Of those who spoke in favor of heli-skiing last year, few if any came in contact with the negative impact I've outlined. They live somewhere else. Did the Valley really benefit from seven days of flying?

Also, as a respondent to the homeowner survey about the heli-skiing, I question the validity of the results. I was not asked to identify myself nor my status as owner. How could the responses be objectively controlled?

In summary, I urge the commissioners to deny the continuation of the heli-skiing in our community and divert these commercial air operations to the Driggs Airport. While I would prefer to come before the Commissioners September 13, I will be traveling.

Respectfully,

Chuck Iossi
Victor, ID 83455

From: Tina Culman
Sent: Monday, September 03, 2012 10:19 AM
To: Angie Rutherford; Dawn Felchle; Kathy Rinaldi; Kelly Park; Bob Benedict
Subject: My Neighborhood and the Proposed High Mountain Heli Application

Dear Public Officials of Teton County ID,

Thank you considering the feedback from those of us living full time in Teton Springs. I am opposed to the High Mountain Heli operation in my neighborhood and want you to know why.

- The helicopter is excessively noisy. I live in the SE corner of the development and the helicopter takes off about a half mile from my house. It flys south and then cuts east towardws me before finally cresting the mountain. It is loud for a long period of time.
- The jet fuel smell is noxious. I've been outside my house and literally had to cover my nose with my scarf. It is totally unacceptable.
- I understand from a group of concerned residents that there is a nesting pair of eagles which have been potentially impacted by the helicopter. They have not had young survive for three seasons and it is very possible the cause is the noise and polution from the helicopter.
- I'm not an expert, but I don't like the idea of a jet fuel truck sitting so close to the gym where I work out. I think it's hazardous.

I think the heliski operation should be based at the airport in Driggs where potential fuel disasters can be controlled and where it will not impact my neighborhood.

Thank you for considering my position.

Tina Culman
Teton Springs
Victor, ID

From: Clint Van Siclen [cvansiclen@gmail.com]
Sent: Friday, August 31, 2012 6:25 PM
To: Angie Rutherford
Subject: Helipad at Teton Springs

I don't live in Teton Valley, although I do own property at the North End and will likely move there within the next couple of years. I greatly appreciate the quiet of the Valley--that is a very rare and special attribute of Teton Valley.

Thus I sympathize with the residents of Teton Springs who must hear the helicopter come and go. So I oppose siting the helipad there (maybe it should go to the Driggs airport, or better, the airport at Jackson). Further, an operation that sets up an illegal helipad should be discouraged, rather than encouraged by allowing the current helipad to be legalized.

Thank you for this chance to comment.

Clint Van Siclen
Idaho Falls, ID 83404

From: JOHN ENGELHART
Sent: Friday, August 31, 2012 4:44 PM
To: Angie Rutherford
Subject: TETON SPRINGS HELI-SKIING

As residents of Teton Springs, my husband and I would like to state our firm opposition to operating commercial heli-skiing out of our quiet community. The numerous reasons for our opposition include: air and noise pollution; the obvious safety concerns regarding daily flights and lack of FAA oversight; negative impact on wildlife; and, most importantly, because of the current existence of the golf course already intersecting the headwaters of the Teton River, further degradation of water quality.

As background for understanding our position, in the recent past, our NJ subdivision had to deal with EPA regulations concerning water quality. Because of the situation we gained a valuable education on what nonpoint pollution is and the numerous detrimental impacts it can have on water quality including drinking water.

So, upon learning of the continuance and proposed expansion of helicopter operations from within our private residential community outside of FAA controlled airspace, we became very concerned. Especially since we were provided very limited information. Then, because of our experience in NJ, we wondered: were all affected parties given all relevant issues and facts that should be taken into account prior to stating a position; how all the pertinent environmental impacts of such a operation could hve been assessed and addressed so quickly; were all required governmental agencies consulted; and has all paperwork been filed, reviewed and finalized?

In seeking answers we did some research into how the State of Idaho complies with the Federal Clean Water Act. From Idaho Water Quality Law 39-3601 et seq: it is the intent of the legislature that the state of Idaho fully meet the goals and requirements of the Federal Clean Water Act (CWA). By 39-3602 definitions, we believe that helicopter operations would be considered as new nonpoint source activity and that stormwater run-off from the helipad (with fuel truck on site) may carry pollutants into the waters of the State. Per 39-3603: The existing instream beneficial uses of each water body & the level of water quality necessary to protect those uses shall be maintained and protected. Where the water quality of waters exceeds levels necessary to support propagation of fish, shellfish and wildlife and recreation in & on the water, that quality shall be maintained unless the (Health & Welfare) department finds, after full satisfaction of intergovernmental coordination and public participation provisions of this chapter, and the departments planning processes, along with planning processes of other agencies, that lowering water quality is necessary to accomodate important economic or social development in the area in which the waters are located. In allowing such reductions in water quality, the department shall assure water quality adequate to protect existing uses fully.

From www.epa.gov/waters/tmdldocs/moody, we learned that a TMDL (total maximum daily load) had been determined by IDEQ in 2002 for Fox Creek in Victor's Teton River subbasin with the goal being to restore full support of designated beneficial uses (Idaho Code 39.3611,3615). And, that section 303 of the Federal Clean Water Act requires IDEQ to adopt, with EPA approval, water quality standards & to review those standards

every 3 years. Additionally, IDEQ must monitor waters to identify those not meeting water quality standards. And, when water bodies are not attaining water quality standards, determine the cause & extent of impairment.

Given what our research has revealed, coupled with some knowledge of the challenging health issues already faced by the water bodies within Teton Springs, personally witnessing the careless transportation of fertilizers/herbicides/pesticides on impervious surfaces surrounding the Headwaters Golf Club and the recent financial investment made at the Driggs Airport, it seems far more economically and environmentally logical to conduct this operation from the airport location. If for reasons unknown to us, this is not a feasible plan, at a minimum we kindly request that due diligence be applied to the permitting process prior to granting any permanent status. Also, we would kindly request that a written assurance and all corresponding documentation be made publically available as a way to ensure compliance with all applicable federal and state laws.

Sincerely,

Cyndy and John Engelhart
Teton Springs

SANDRA P. VEST
Teton Village, WY 83025

August 29, 2012

VIA email – ***pzadmin@co.teton.id.us***
Teton County Idaho Planning Department
150 Courthouse Drive, Room 107
Driggs, ID 83422

RE: Public Hearing and Solicitation for Comments for Heli Ski Operations at Teton Springs

Board of County Commissioners:

As a property owner and part-time resident of Teton Springs I wholeheartedly support the heli-ski operations at the resort. This type of backcountry experience is highly sought after by avid skiers in the US and around the world. I had the opportunity to meet some of the heli-skiers last year and several were from Germany and Russia. They would not have been in Teton Valley were it not for heli-skiing. The Commission should encourage this winter activity and welcome these visitors and the positive economic impact they have on the community. For those who would say the benefit is only to the resort, I would beg to differ. These people dine in area restaurants, shop in local stores, purchase gas for their rental cars, etc.

You will no doubt hear numerous comments about extreme noise associated with this operation. In my opinion these objections are entirely overstated. The helicopter is actually very quiet and limits on time, frequency, and route of flight mean impact is minimal.

The expansion of winter tourism is essential to growing the economy of the valley and access to heli-skiing has the potential to greatly accelerate that expansion.

I encourage the Commission to approve amending the Teton Springs Development Agreement in any way that would insure ongoing heli-ski operations.

Thank you,

Sandra P. Vest

From: John Fisher
Sent: Tuesday, September 04, 2012 9:45 AM
To: Angie Rutherford
Subject: Teton Springs Heli Pad

I want to address the above issue which will be discussed on Sept 13th.

I have been a homeowner in Teton Springs since February 2010. I intend to become a full time resident in 2013.

I do not know enough about the issues to take a side but I offer the following comments and questions.

1. Have they evaluated other possible sites for the Heli Pad outside Teton Springs which would eliminate the issue all together--Driggs Airport or the farm land just to the east of the Springs? The 2nd location would still provide close access to the TS hotel.

2. If the proposal is considered shouldn't it be for a lesser use, similar to last year, to further evaluate the impacts to the residents and environmental issues?

3. Part of the problem is the pilot's disregard for the approved flight path. At the last HOA meeting the owner of the company said to call him if we noticed the pilot being off course. Is it our responsibility to monitor this? If the proposal is approved should a provision be included that the permit will be revoked for the first violation of the flight plan?

4. Part of the problem is the smell of aircraft fuel. It will constantly be present near the lodge. Hotel guests will have to deal with this which may reduce the number of guests vs increasing them. How will this be dealt with?

5. Have the benefits to Teton Springs residents been identified?

Please consider my comments and questions during the hearing next week.

Thank You

John Fisher

Continued on next page ...

Valley Advocates for Responsible Development

September 4, 2012

Teton County Board of County Commissioners
150 Courthouse Drive
Driggs, Idaho 83422

RE: Teton Springs Application for Permanent Helipad Approval

Dear Commissioners:

There are several obvious economic benefits to permitting High Mountain Heli (HMH) to offer heliskiing tours in Teton Valley. From many perspectives, a 4-season resort may be one of the best locations to host this type of high-impact commercial/tourist use. That said, Teton Springs is not purely a resort community. It also incudes a growing number of year-round residents who purchased homes in what they expected to be a quiet, residential planned community. In addition, many others own vacant lots in Teton Springs who see their ownership as an investment for resale. Thus, the economic interests and impacts of all of these property owners is very different. All of these diverse and often divergent property interests must be considered here. In addition, there are several lingering issues in the record that must also be resolved.

Conflicting Testimony Regarding Noise and Pollution.
At the December 15, 2012 public hearing to consider a Temporary Use Permit (TUP) for this helipad, representatives from HMH stated their helicopters produce zero emissions and do not create noise levels above 85 decibels.[1] This testimony heavily factored into the ultimate approval of the TUP. This winter however, several residents of Teton Springs who live in close proximity to the helipad filed complaints to Teton County regarding the noise and pollution impacts from the helicopters.[2]

To date, there are 10 homes and 32 vacant residential lots within 1,000 feet of the newly proposed helipad site East of the Lodge. There are two homes within 500 feet of the helipad site.[3] Assuming that helicopters are in fact noisy and generate lingering fumes as alleged by those who live near the helipad, this conflict between year-round residents seeking peace and quite versus a commercial business pursuing 560 flights a season (up to 14 flights per day) is not likely to soften over time. As homes continue to be built in Teton Springs and more people become permanent residents of this community, this

[1] Teton County Board of County Commissioner minutes pages 2-3 (December 15, 2012).

[2] *See,* Letter from Diane Murphy citing noise and fume impacts (February 10, 2012); Letter from Pamela Colby citing noise and fume impacts (March 9, 2012); Letter from Chuck Iossi citing noise and fume impacts (March 9, 2012).

[3] Teton County GIS mapping program.

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conflict between residents who are living with the impacts on a daily basis and the commercial interests of the resort are likely to intensify. This speaks to the appropriateness of this location and whether it is at all possible to mitigate the adverse impacts of this commercial use.

Conflicting Testimony Regarding Helicopters Flying off Course

Teton County's Staff Report states that HMH deviated off course on only February 3, 2012, and that it was corrected immediately.[4] However, the record reveals that at least three residents of Teton Springs filed complaints this winter reporting that the helicopters deviated from the promised flight path on at least three separate occasions, flying in close proximity to homes.[5] This is in addition to the repeated complaints regarding noise and pollution impacts.

The TUP vests the Teton County Planning Administrator with the authority to revoke or modify the TUP for (1) any misrepresentations in the original application, (2) for violation of one or more of the terms, conditions, or uses upon which the permit was granted, or (3) if the permit becomes detrimental to the public health, safety, or welfare and such was not the condition at the time of approval.[6] The record indicates that the public has repeatedly reported violations of flight patterns, as well as noise and pollution impacts far exceeding the quiet pollution free helicopters that were originally represented to the county. However staff has declined to take action in response to these complaints during this past season.

Impacts to the Bald Eagle Nest Which Has Now Failed 3 Years in A Row.

There is a bald eagle nest Southwest of the helipad site. Idaho Fish & Game (IDFG) reports that although the nest has been successful in years past, the eaglets in this nest died for the 3rd season in row this winter. Disturbances can scare adult eagles off the nest, causing the young eaglets to perish from cold and exposure due to lack of feather development.[7] The record indicates that IDFG takes this issue seriously and will soon submit comments regarding impacts to this nest.[8]

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[4] Teton County Staff Report, pages 4-5.

[5] *See,* Letter from Pamela Colby reporting repeated flights over homes to the Southwest of the helipad (February 3, 2012); Letter from Diane Murphy reporting flights to the Southwest of the helipad over the bald eagle nest (February 18, 2012); Letter from Diane Murphy reporting how flights over the bald eagle nest to the Southwest of the helipad altered the behavior of the eagles, causing them to leave the nest unattended (September 3, 20120); Letter from Chuck Iossi including March 10, 2012 video footage showing an HMH helicopter deviating from the flight path (September 3, 2012).

[6] *See,* Teton Springs Temporary Use Permit, page 2 (December 11, 2012 (sic)).

[7] Phone and email interviews with IDFG staff (August 29-30, 2012).

[8] *See,* Letter from Idaho Fish & Game (August 27, 2012).

The Planning Staff's report concludes: *The most critical egg incubation period does not occur from Christmas to March 31, which is the defined heli-ski period.*[9] There is no agency comment in the record to support this conclusion. To the contrary, there is commentary in the record from the U.S. Fish & Wildlife Service (USFWS) that the nest failed in both 2010 and 2011, the eagles appear to be habituated to human impacts, but they would be monitored this following winter.[10] HMH has reported that they did operate winter flights in both 2010 and 2011, which are the two prior seasons when the nest failed.[11] In addition, there is public comment in the record documenting flights over the eagle's nest as well as observations by the public on how the flights caused the adult eagles to leave the nest, resting on the power lines instead.[12] It appears that the the staff's conclusion is unsupported by the record.

If the Development Agreement is Amended, There is No Further Review

One last issue to carefully consider here is that last season was a very slow year. HMH flew 138 flights, which was 25% of the total number of flights allowed under the TUP that is now up for permanent approval. Teton Springs is a residential community that is only 29% built out right now.[13]

Even with such a low housing occupancy, there were numerous complaints from residents citing adverse impacts from one season of helicopter flights - even when only

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[9] Teton County Staff Report, page 6-7.

[10] *See* U.S. Fish & Wildlife Service letter to Teton County, April 3, 2012.

[11] *See,* HMH statement to Teto County Board of County Commissioners (August 26, 2011):

> HMH was first contacted by principle owners and GM of Teton Springs in 2002 regarding operations from their heliport. We began operating there on a limited basis beginning early that winter of 02-03. In January of 2004, following a complaint by a Victor resident, we learned that P&Z had some issues with the use of the heliport. That summer we were assured again by principles of Teton Springs that everything had been worked out with the county and we were invited to continue to use the heliport. Operations continued each winter on a limited basis until, following another complaint by the same resident; the issue resurfaced again last winter.

[12] Letter from Diane Murphy reporting flights to the Southwest of the helipad over the bald eagle nest (February 18, 2012); Letter from Chuck Iossi including photo of an adult bald eagle resting on the power lines on March 3,2012 which is a date showing flight activity from HMH (March 3, 2012); Letter from Diane Murphy reporting how flights over the bald eagle nest to the Southwest of the helipad altered the behavior of the eagles, causing them to leave the next unattended (September 3, 20120).

[13] Of the 739 lots platted in Teton Springs, 212 have homes constructed on them. This is 29% build out. Source: Teton County Planning Department Subdivision Spreadsheet (August 2012).

25% of the allowed flights were used last year. As stated earlier, there are 10 homes within 1,000 feet of the newly proposed helipad site and 32 more vacant lots. If permanent approval is granted for 560 flights a year, there will be no additional review, even if the cumulative impacts from those flights become unmanageable for the growing number of residents moving into Teton Springs.

Although you may receive pressure to approve this permit well in advance of the 2012 heli-skiing season, it is critical that you do your due diligence, particularly with such a potentially high-impact, dangerous, and permanent use. Thank you once again for all of your hard work in the service of our community.

Sincerely,

Anna Trentadue
VARD Staff Attorney / Program Director

The following comments were received after the deadline and will be given to the Board the evening of the hearing….

From: Scott Rehberg
Sent: Tuesday, September 04, 2012 11:53 AM
To: Angie Rutherford
Subject: Heli ski operations

Good Day,

Once again, I find myself tapped to offer support for the Heli-Ski operation running out of Teton Springs and it's supposed singular destruction of the valley. Frankly, my opinion is most of the folks complaining have more money and time than they have common sense.
After I weighed in last year I received a threatening letter- no return address- describing my ignorance and threatening purposeful, malicious financial detriment to my business by means of spreading some sort of ridiculous boycott; the very definition of terrorism.

Normally I never speak to my past and no specific details will be provided here, nor will you ever find anything accurate, regardless of any effort to do so. As to the paper-ass nit wit who sent these letters, you obviously know who I am, where I live, so come on down like a man and let's see what you got. I too have an extensive military background including my fair share of carnage. I suffer from severe PTSD as a result of time spent being blown up in Beirut and loading the dead. So everyone who wants to bring up these strong emotions as fodder against or for a simple helicopter operation for skiing, STOP IT. It makes you look weak, kinda like the sissy who sent me the letter.

More to the point, emissions, noise, whatever. The EMT truck that runs up and down the damn road all day every day spews more diesel exhaust and is spending my money and yours to operate than is probably necessary. Caveat: I in no way diminish what these folks do, I just wonder about the efficacy of this unit as general transportation to and from lunch. The truck did provide great cover from oncoming vehicles when my diesel truck was wailed into by a person determined to have been driving too fast. Thank you and your carbon footprint.

We also have an airport, which has airplanes and helicopters –go figure- flying in and out of this valley every day. Two days ago I saw several Black-hawks flying low and slow probably taking some dignitary fly-fishing. I have not heard a peep about this and it is a fairly predictable sight that will continue to fly whenever and wherever they want, including the air-space above Teton Springs.

The man is trying to make money. It is his business and as someone who has done a very minor job for him with no expectations of getting rich or regularly asked to do work for, I can safely say I am objective. I think I cashed out two C-notes; the sum total I have ever made for my services rendered to his business. Don't people have more important things to do than re-visit this same crap every year? Redundant question. At least extend the approval for a five year term and stop wasting money. I will not hide the fact that I find politicians, for the most part, ineffectual. I try to mind my own business and wish others would do the same.

Yes, I have diesel equipment and diesel trucks and dirt-bikes that I love to tear through these mountains with. We all have the right, where indicated by law, to recreate as we see fit with these carbon spewing machines. If I had the jack, I'd buy my own damn helicopter and top out somewhere every morning for freshies. You don't like it because hiking is slower to ski the goods? tough shit; get up earlier. As it is, my ski pass and yours supports the broke-down, bankrupt Targhee ski resort which leaves it's own carbon footprint. Yet I see plenty of people utilizing diesel fueled transport up and down the

slopes. How does the snow get removed and roads maintained within the Teton Springs compound? Damn sure not a Prius with a snow plow. Who responds to your emergencies within the compound, Paramedics on dog sleds? Grow the hell up and if you really want altruism, shovel snow with your silver spoon.

One more thing, I don't know how or why someone gets to send terrorist letters and threats unabated, UN-investigated and UN-prosecuted, but rest assured if it happens again, the law will be the least of your worries.

I gotta get back to work.

Press On,
Scott Rehberg

From: Kathleen Batyr
Sent: Friday, September 07, 2012 8:29 AM
To: Angie Rutherford
Subject: Teton Springs Heli Pad Permanent Application

Commissioners,

I am a resident of Teton Springs, and I live in close proximity to the current location of the heli pad. In fact, I live approximately 200 yards from the club house.

Prior to my current residence, during the first year that flights were run from Teton Springs, I lived in a forest cabin quite near the Eagle's nest – in fact, close enough to watch them daily from my back porch – I often had them perched on my roof. I work at home, and I could hear the helicopter taking off and would watch it's path. In fact, I would be excited to see it. It would fly over houses, obviously, to get to it's destination in the forest, but I never saw it "dangerously close" to any home or anywhere near the eagles nest. And I never experienced any "jet fumes" at that home.

Now, at my current residence, I can actually watch the helicopter take off – another exciting site for me. My only disappointment with the location of the flight path from the helipad is that it blows snow around the freshly groomed nordic track. That is just disappointment – not a complaint.

I live in a Resort Community that offers many amenities. One of those amenities is a golf course. I offer that the golf course maintenance vehicles seem to be noisier and certainly smellier than the helicopter. Why – because I sleep with my windows open and they start their jobs before 7 am and I can hear them. I am not complaining about them because I chose to live on a golf course and that is part of life on a golf course.

I am not affected by the helicopter. It takes off a few times a day and I stop to watch it. I can barely hear it from inside my house – I keep my windows closed during the winter months. Again, I live in a resort community that offers many amenities. I believe that heli-skiing is a fantastic addition to what Teton Springs has to offer and will make it the high end resort that everyone that lives here should want it to be.

Thank you for your time.

Kathleen Batyr

From: Jon Shick
Sent: Sunday, September 09, 2012 1:41 PM
To: Curt Moore; Angie Rutherford
Cc: Jeff Naylor
Subject: helicopter emissions and letter of support

Dear Curt and Angie,
I have attached 3 documents that contain useful data for evaluating helicopter emissions. The first is a letter from a Mr Ed Montgomery addressed personally to me but intended for the Board of County Commissioners. He is a helicopter pilot of 35 years and his letter explains in detail helicopter emissions. Please accept this information and his letter of support.
The other 2 attachments contain studies and graphs of different helicopter and vehicle emissions. I will use some of this data at the meeting and these are the documents that it comes from.
Thank you,
Jon Shick

***

Mr. Jon Shick September 7, 2012
High Mountain Heli-Ski
Jackson, WY

Hello Jon,

I understand that you're company is the subject of an upcoming meeting with the Teton County, Idaho Board of County Commissioners and one of the subjects to be addressed is your conditional use permit to conduct Heli-ski operations out of Victor, ID.
I further understand that at issue is the possibility that your conduct of these operations will have an adverse impact due to excessive emissions and the noise footprint from the helicopter that you utilize while conducting those operations.

First let me give you a brief background of myself, I'm an experienced helicopter and fixed wing pilot with over 35 years and 18,000 hours of experience in the aviation field. I've conducted helicopter operations world wide and I've lived in Jackson, WY for the last 25 years. I understand the emotions involved when the thought of something different taking place in an area that is beautiful and is thought of as your backyard. For this reason I would like to give my opinion on this subject with some easily obtained facts along with the knowledge of my experience.

First of all the issue of excessive emissions due to your operations is a valid concern for the layman and one that can easily be addressed once the agenda, emotions and disinformation from certain groups of individuals is removed and answered with the facts.

The Bell 407 helicopter that your company utilizes is actually one of the most technologically advanced light aircraft that is being utilized today. It's engine, the Rolls Royce 250-C47B turbine, is equipped with a computer controlled electronic FADEC fuel control system that continually monitors and adjusts the engine fuel system to provide the most efficient fuel burn of any light helicopter in it's class. This helps the engine provide as complete a fuel burn of aviation jet fuel as possible.

Now let's talk about jet fuel, like all jet fuels it's derived by finely filtering out all of the impurities from fuel oil. Automotive diesel fuel is also made from fuel oil but it doesn't have as many filtering processes done to it to remove all of the impurities as jet fuel does. These impurities would be detrimental to safe engine performance for all aviation activities but the EPA feels that they are not a health issue or detrimental to automotive operations.

As all of us who live in a high mountain environment in the winter months knows, there is an abundance of blue vehicle diesel fuel fumes that hangs in the air from all of the snow plows, tractor trailers and diesel powered light vehicles and trucks that are necessary for supplying our communities with our commodities, along with clearing our roads and driveways of snow and of course from our daily commuting. It's one of the things that we've become accustom to while living in the mountains. The EPA has set those vehicle diesel fuel emission standards and has deemed them safe for us to live with. (See the attached EPA vehicle emissions standards tables)
Remember we're talking about a lot of diesel powered vehicle operations on a daily basis in all of these mountain communities not to mention the gasoline powered vehicles performing the same daily operations and their emissions.

The EPA has also set emission standards for aviation aircraft and along with input from the FAA and NTSB on safety considerations they've arrived with an emission standard for the safe conduct of aerial operations. One of those considerations was the reliability of the fuels being burned in the engines of all aircraft. What became necessary was for all of the impurities to be filtered out of standard diesel fuels so the fuel filters on these aircraft wouldn't become clogged and cause an engine to flame out or quit running. By doing this they have also been able to burn cleaner with fewer emissions. What was derived from this was Aviation Jet Fuel.

Take a look at the Guidance to Determination of Helicopter Emissions Report that I've attached to this letter and pay particular attention to the Bell 407 emissions. This report will help you understand the small amount of emissions that are actually produced by the Bell 407. This is a direct result of Bell Helicopters engineering and the use of a computerized electronic FADEC fuel control system. In my opinion there is actually no better light helicopter that could be used in a mountain environment than this type of aircraft.

All of this information is easily obtained on the internet and should be available to any individuals who haven't been subjected to any disinformation from various groups of individuals who have an agenda that would be in opposition to your operation with a little bit of effort. Once this knowledge is available to them it should help them take the emotion out of a sound decision regarding this issue.

The issue of noise is altogether a different subject but once again due to Bell Helicopters engineering of the four bladed rotor systems on Bell 407 aircraft it's one of the quietest aircraft in the light helicopter class for operations in an urban environment. This along with a fly neighborly attitude by your operation and pilots and good working input from the affected individuals to arrive at safe approach and departure routes with the least noise footprint from your pickup spots, you should be able to mitigate any issues that would be detrimental to your surrounding neighbors.

If it would help I would be more than agreeable to work out something with you, the Board of Teton County Commissioners and the affected individuals to help determine the safest approach and departure routes that would have the lowest noise footprint to help mitigate these issues.

I hope I have been of help. If you have any questions please feel free to contact me at your convenience.

Regards,

Ed Montgomery
Vertical Development LLC
Jackson, WY 83001

Table 4-43: Estimated National Average Vehicle Emissions Rates per Vehicle by Vehicle Type using Gasoline and Diesel (Grams per mile)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
GASOLINE (assuming zero RFG)																					
Light-duty vehicles																					
Exhaust HC	2.79	2.50	2.23	1.98	1.77	1.57	1.39	1.25	1.14	1.05	0.97	0.89	0.81	0.74	0.61	0.52	0.46	0.42	0.39	0.36	0.33
Nonexhaust HC	1.21	1.17	1.12	1.09	1.07	1.05	1.03	1.01	0.98	0.95	0.91	0.88	0.84	0.81	0.77	0.72	0.68	0.62	0.57	0.51	0.46
Total HC	4.00	3.67	3.35	3.07	2.84	2.62	2.41	2.26	2.12	2.00	1.88	1.77	1.65	1.54	1.37	1.25	1.13	1.04	0.95	0.87	0.79
Exhaust CO	42.89	39.15	35.54	32.23	29.32	26.60	24.18	22.38	20.86	19.54	18.53	17.80	16.98	16.14	13.79	12.57	10.87	10.28	9.68	9.20	8.73
Exhaust NO_x	2.70	2.47	2.27	2.09	1.94	1.78	1.64	1.55	1.46	1.35	1.29	1.25	1.20	1.14	1.00	0.92	0.79	0.73	0.67	0.61	0.56
Light-duty trucks																					
Exhaust HC	3.68	3.33	3.00	2.71	2.45	2.21	1.96	1.80	1.65	1.54	1.45	1.35	1.24	1.13	0.96	0.78	0.69	0.64	0.55	0.51	0.48
Nonexhaust HC	1.37	1.30	1.21	1.17	1.13	1.11	1.08	1.05	1.02	1.00	0.98	0.95	0.90	0.84	0.80	0.76	0.71	0.66	0.62	0.58	0.53
Total HC	5.05	4.63	4.21	3.88	3.59	3.32	3.04	2.85	2.68	2.54	2.43	2.30	2.14	1.98	1.76	1.54	1.40	1.31	1.17	1.09	1.01
Exhaust CO	56.23	51.99	47.93	44.34	40.77	37.51	34.47	32.20	30.23	28.28	26.81	25.43	23.85	21.51	18.76	16.23	14.33	13.52	12.49	11.76	11.02
Exhaust NO_x	2.62	2.42	2.26	2.11	1.98	1.84	1.73	1.65	1.59	1.55	1.54	1.53	1.50	1.45	1.32	1.21	1.09	1.02	0.94	0.88	0.81
Heavy-duty vehicles																					
Exhaust HC	3.66	3.34	3.03	2.76	2.39	2.16	1.94	1.73	1.51	1.35	1.22	1.09	0.98	0.82	0.73	0.64	0.53	0.48	0.42	0.32	0.28
Nonexhaust HC	2.74	2.60	2.34	2.25	2.16	2.07	1.97	1.87	1.79	1.69	1.62	1.54	1.48	1.41	1.35	1.24	1.14	1.07	0.99	0.92	0.86
Total HC	6.40	5.94	5.37	5.00	4.55	4.24	3.91	3.60	3.29	3.04	2.84	2.63	2.46	2.24	2.08	1.88	1.67	1.54	1.41	1.24	1.14
Exhaust CO	85.61	78.64	72.12	65.92	60.01	54.16	48.52	43.26	38.82	34.54	31.08	27.59	24.73	20.60	18.46	16.73	14.51	13.55	12.38	9.96	9.42
Exhaust NO_x	7.19	6.96	6.72	6.52	6.35	6.11	5.89	5.73	5.56	5.40	5.26	5.13	5.01	4.91	4.62	4.28	3.73	3.33	2.94	2.58	2.25
Motorcycles																					
Exhaust HC	2.01	1.88	1.82	1.75	1.72	1.69	1.63	1.63	1.62	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
Nonexhaust HC	0.74	0.73	0.72	0.72	0.71	0.71	0.70	0.69	0.70	0.70	0.70	0.70	0.70	0.70	0.69	0.69	0.69	0.68	0.68	0.68	0.68
Total HC	2.74	2.60	2.54	2.46	2.43	2.40	2.34	2.32	2.32	2.31	2.31	2.31	2.31	2.31	2.31	2.30	2.30	2.29	2.29	2.29	2.29
Exhaust CO	15.15	14.78	14.77	14.76	14.76	14.67	14.59	14.59	14.59	14.59	14.59	14.59	14.59	14.59	14.59	14.58	14.59	14.59	14.59	14.59	14.59
Exhaust NO_x	1.26	1.28	1.28	1.28	1.28	1.26	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
DIESEL																					
Light-duty vehicles																					
Exhaust HC	0.68	0.69	0.71	0.73	0.75	0.77	0.79	0.81	0.81	0.82	0.80	0.76	0.73	0.73	0.60	0.58	0.48	0.36	0.29	0.23	0.18
Exhaust CO	1.49	1.52	1.56	1.60	1.64	1.69	1.73	1.76	1.78	1.79	1.78	1.75	1.73	1.74	1.59	1.57	1.41	1.21	1.09	0.99	0.90
Exhaust NO_x	1.83	1.85	1.86	1.87	1.89	1.89	1.89	1.88	1.86	1.85	1.81	1.72	1.62	1.54	1.43	1.32	1.11	0.85	0.69	0.53	0.42
Light-duty trucks																					
Exhaust HC	1.59	1.60	1.64	1.64	1.68	1.67	1.69	1.63	1.51	1.42	1.02	0.88	0.96	0.97	0.98	0.80	0.79	0.63	0.55	0.48	0.44
Exhaust CO	2.67	2.70	2.76	2.77	2.85	2.85	2.89	2.79	2.60	2.44	1.77	1.54	1.66	1.68	1.68	1.37	1.34	1.06	0.93	0.82	0.76
Exhaust NO_x	2.71	2.66	2.62	2.56	2.53	2.46	2.42	2.31	2.17	2.07	1.76	1.64	1.67	1.66	1.59	1.37	1.30	1.09	0.94	0.82	0.72
Heavy-duty vehicles																					
Exhaust HC	2.21	1.97	1.74	1.55	1.38	1.23	1.10	1.00	0.92	0.85	0.79	0.74	0.69	0.61	0.58	0.54	0.51	0.48	0.45	0.42	0.39
Exhaust CO	10.06	9.22	8.43	7.71	7.00	6.32	5.73	5.23	4.80	4.43	4.10	3.82	3.58	3.37	3.19	3.05	2.90	2.66	2.31	2.01	1.75
Exhaust NO_x	23.34	22.14	21.47	21.10	20.75	20.49	20.24	20.04	19.84	19.14	18.05	16.68	15.52	13.92	12.50	11.45	10.55	9.60	8.61	7.77	6.87
Average Emissions Per Vehicle, Gasoline and Diesel Fleet																					
Exhaust HC	2.98	2.70	2.42	2.18	1.96	1.76	1.56	1.43	1.32	1.23	1.16	1.08	0.99	0.91	0.77	0.65	0.58	0.54	0.48	0.45	0.42
Nonexhaust HC	1.21	1.16	1.10	1.06	1.04	1.01	0.99	0.97	0.94	0.91	0.89	0.86	0.82	0.77	0.74	0.69	0.65	0.60	0.56	0.51	0.47
Total HC	4.20	3.86	3.52	3.24	3.00	2.77	2.55	2.40	2.26	2.14	2.04	1.93	1.81	1.68	1.51	1.35	1.23	1.15	1.04	0.96	0.89
Exhaust CO	45.07	41.43	37.93	34.76	31.84	29.12	26.65	24.90	23.40	22.00	20.94	20.02	18.94	17.49	15.24	13.56	11.95	11.32	10.55	9.93	9.37
Exhaust NO_x	4.15	3.92	3.75	3.61	3.49	3.36	3.24	3.18	3.12	3.02	2.91	2.78	2.65	2.48	2.25	2.07	1.87	1.73	1.57	1.44	1.30

KEY: CO = carbon monoxide; HC = hydrocarbon; NO_x = nitrogen oxide; RFG = reformulated gasoline.

NOTES

Data are as of July 1 of each year. Vehicles types are defined as follows: light-duty vehicles (passenger cars up to 6,000 lb GVWR); light-duty trucks (pickups and minivans up to 8,500 lb GVWR); heavy-duty vehicles (8,501 lbs or more GVWR); motorcycle (highway only). This table is based on MOBILE6, the U.S. Environmental Protection Agency's (EPA) latest highway vehicle emissions factor model. Interested readers can learn more about the MOBILE6 model at the following USEPA Internet site http://www.epa.gov/otaq/m6.htm.

Emissions factors are national averages based on the following assumptions: ambient temperature 75 ºF, daily temperature range 60-84 ºF, average traffic speed 27.6 mph (representative of overall traffic in urban areas), standard operating mode (cold-start, hot-start, stabilized), vehicle-miles traveled fractions, no inspection/maintenance or antitampering programs, and gasoline volatility 9.0 per square inch RVP (Reid vapor pressure).

See table 4-44 for emissions from vehicles operating on reformulated gasoline.

Data for nonexhaust HC is negligible for diesel light-duty vehicles, light-duty trucks, and heavy-duty vehicles.

Average emissions per vehicle rates assume a fleet comprised exclusively of gasoline and diesel vehicles. For emissions estimates of a fleet using RFG and diesel, see table 4-44.

SOURCE

U.S. Environmental Protection Agency, National Vehicle and Fuel Emissions Laboratory, personal communication, June 28, 2010.

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of the
Environment, Transport, Energy and Communications DETEC

Federal Office of Civil Aviation FOCA
Division Aviation Policy and Strategy

Theo Rindlisbacher

Guidance on the Determination of Helicopter Emissions

Reference: 0 / 3/33/33-05-20

Edition 1 - March 2009

Reference: 0 / 3/33/33-05-020 Guidance on the Determination of Helicopter Emissions, Edition 1, March 2009, FOCA, CH-3003 Bern
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This document has been released for publication by FOCA, Aviation Policy and Strategy, Director M. Zuckschwerdt, 25. March 2009

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Appendix F: Graphical Representation of Approximation Functions for Turboshaft Engines

Motivation and Summary

The civil aviation emission inventory of Switzerland is a bottom-up emission calculation based on individual aircraft tail numbers, which includes the tail numbers of helicopters. Although helicopters may be considered a minor source of aviation emissions, it is interesting to see that in a small country like Switzerland, more than 1000 individual helicopters have been flying in the last couple of years, some of them doing thousands of cycles or so called rotations. Switzerland therefore needs to include helicopters in the country's aviation emission inventory. However helicopter emissions are extremely difficult to assess because their engine emissions data are usually not publicly available and there is no generally accepted methodology on how to calculate helicopter emissions known by FOCA. In the past, the helicopter emission estimations done by FOCA have been based on two engine data sets only. Assumptions for fuel flow and Nitrogen oxides (NO_x) have been conservative and it has become evident that the share of helicopter emissions in the emission inventory of Switzerland has been significantly overestimated so far, at least for CO_2 and NO_x.

FOCA therefore launched project HELEN (**HEL**icopter **EN**gines) in January 2008 with the main goal to fill significant gaps of knowledge concerning the determination of helicopter emissions and to further improve the quality of the Swiss civil aviation emission inventory. The FOCA activity for engine emission testing is based on Swiss aviation law[1], which states that emissions from all engine powered aircraft have to be evaluated and tested. The legal requirement also incorporates aircraft engines that are currently unregulated and do not have an ICAO[2] emissions certification – like aircraft piston, helicopter, turboprop and small jet engines. Helicopter engine emissions have been measured at the engine test facility of RUAG AEROSPACE, Stans, Switzerland, where turboshaft engines are tested after overhaul. The measured turboshaft engines are owned by the Swiss Government. As turboshaft engine emissions measurements during ordinary engine performance tests are not very costly, the measurements have been extended to incorporate particle emissions, smoke number, carbonyls and to study the influence of different probe designs used for small engine exhaust diameters. These measurements have been performed by DLR INSTITUTE OF COMBUSTION TECHNOLOGY, Stuttgart, Germany. The documentation of the measurements is currently in preparation for publication.

The results of the measurements as well as confidential helicopter engine manufacturer data are the basis for the suggested mathematical functions for helicopter engine emission factors and fuel flow approximations. In order to make the functions work, only the input of shaft horsepower (SHP) is necessary. The maximum SHP of the engine(s) of a certain helicopter must first be determined and can be found in spec sheets or in flight manuals. Percentages of maximum SHP for different operating modes and times in mode are listed and are differentiated between three categories of helicopters: piston engine powered, single and twin turboshaft powered helicopters. Calculated shaft horsepower for different modes is then entered into approximation formulas which provide fuel flow and emission factors.

Power settings and times in mode for the modelling have been established with in-flight measurements, from helicopter flight manuals and with the help of experienced flight instructors. The result is an estimation of LTO[3] and one hour emissions for individual helicopter types. It has to be noted that helicopters may fly many cycles (rotations) far away from an airport or heliport, especially for aerial work. To overcome problems with activity data, estimations of per hour emissions are suggested to complement the LTO values. In the case of Switzerland, helicopter companies transmit the annual flight-hours of their helicopters to FOCA, which allows applying a flight-hour based emissions calculation in most cases. This guidance suggests using the emission values per hour also for determination of helicopter cruise emissions. Finally, the guidance material offers a summary list of helicopters with estimated LTO and one hour emissions for direct application in emission inventories.

[1] SR 748.0, LFG Art. 58
[2] International Civil Aviation Organisation
[3] LTO = Landing and Take-off cycle

1. Classification of Helicopters by Engine Category

1.1 Piston Engine Powered Helicopters

Piston engine powered helicopters are the smallest helicopter category. Most of them are two-seaters used for pilot education and training. Their operation includes a lot of hover exercises. Generally, they are operated at low level and at low altitudes because of their limited high altitude performance. Typical engines have four or six horizontally opposed cylinders and are air cooled. The engine technology goes back to the 1950s. The engines run on gasoline (AVGAS or MOGAS). For operational studies, the **Schweizer 269C** and the **Robinson R22** have been selected as the representative helicopter in this category.

1.2 Single Engine Turboshaft Powered Helicopters

The majority of civil helicopters are powered by a single gas turbine with a shaft for power extraction (“turboshaft engines”). The shaft drives a reduction gear for the main rotor and the tail rotor. Maximum shaft power for this helicopter category is normally in the range of 300 to 1000 kW. Most of the turboshaft engine compressors are single stage and the driving shaft is a free turbine, which means that it is not mechanically connected to the compressor shaft. The engines run on jet fuel. For operational studies, the **Eurocopter AS350B2 Ecureuil** has been selected as the representative helicopter in this category.

1.3 Twin Engine Turboshaft Powered Helicopters

The basic engine design is normally identical to that of the single engine turboshaft helicopters. The reason for making a distinction is the fact that the engines run at significantly lower power during normal operation compared to a single engine powered helicopter. If one engine should fail, the remaining engine is capable of restoring nearly the performance of the helicopter at twin engine operation. This has to be taken into account when doing emissions calculations, as e.g. a doubling of the fuel flow of the single engine for a twin engine helicopter would result in an excessive overestimation of the fuel consumption. For operational studies, the **Agusta A109E** (MTOM 2850 kg) and the **Eurocopter AS332 Super Puma** (MTOM 8600 kg) have been chosen as the representative helicopters in this category.

2. Operational Assumptions for Emissions Modelling

2.1 General Remarks about Helicopter Operations and their Modelling

In contrast to fixed wing aircraft, helicopters usually need a high percentage of the maximum engine power during most of the flight segments. They often fly cycles (or so called rotations) away from an airport or heliport, especially for aerial work. This poses special problems to emissions estimation of helicopters. Airport or heliport movements are usually not consistent with the actual number of rotations flown. This guidance material suggests two ways of how to deal with helicopter emissions:
A practitioner may use one of the three suggested standard LTO cycles below, corresponding to the respective helicopter category and multiply the resulting LTO emissions (see section 3) with the number of LTO (= number of movements divided by 2). This is suggested for airport LTO emissions calculation.
For a country's emission inventory, the practitioner may use the emissions calculation given per flight-hour, if the helicopter operating hours are known. In this case, helicopter rotations and cruise are considered to be included and the final emission calculation is given simply by multiplying the emissions per hour by the number of operating hours.
If helicopter cruise emissions have to be calculated for a given flight distance, it is suggested to start again with the emissions per hour data and divide them by an assumed mean cruising speed for the respective helicopter type.

Example: Estimated fuel consumption for helicopter type XYZ (see section 3) = 133 kg fuel / hour
Mean cruising speed (from spec sheet, flight manual etc.) [4] = 120 kts
→ 133 kg fuel / hour divided by 120 Nautical Miles / hour = 1.11 kg fuel / Nautical Mile
The value of 1.11 kg fuel / Nautical Mile is multiplied by the number of Nautical Miles flown in order to get the number of kg fuel.

2.2 Piston Engine Helicopter Operations

Engine running time on ground shows a great seasonal variability, with a long engine warm up sequence in winter and a long cool down sequence at the end of the flight in summer (air cooled engines). Total engine ground running time has been determined between 6 and 10 minutes. Climb rate has been assumed 750ft/min based on performance tables of the reference helicopter manuals, resulting in more time needed to climb 3000ft (LTO) with piston engine than with turboshaft powered helicopters. However, approach time is considered similar to the other helicopter categories.
Engine percentage power for ground running is higher than for piston engine aircraft. From RPM and Manifold Pressure indications, it is assumed 20% of max. SHP. For hover and climb, nearly full SHP is used. According to information from experienced flight instructors, cruise power is usually set near the maximum continuous power. Therefore, 90% of max. SHP is the suggested cruise value. Approach shows a large variation in power settings, but it is generally relatively high (60% of max. SHP), either for maintaining a comfortable sink rate or for gaining speed in order to reduce flight time.

Table 1: Suggested times in mode and % of max. SHP for piston engine helicopters. GI1 = Ground Idle before departure, GI2 = Ground Idle after landing. TO = Hover and Climb, AP = Approach. "Mean operating % power per engine" = power setting for determination of emissions per flight-hour.

GI1_Time (Min.)	TO_Time (Min.)	AP_Time (Min.)	GI2_Time (Min.)	GI1 %Power per engine	TO %Power per engine	AP % Power per engine	GI2 %Power per engine	Mean operating % power per engine
4.0	4.0	5.5	4.0	20	95	60	20	90

[4] Aircraft or helicopter speeds are often given in kts (knots). 1 knot = 1 Nautical Mile per hour

2.3 Single Engine Turboshaft Helicopter Operations

The values of table 2 have been generated from flight testing. An example of detailed recording and calculation of weighted averages is given in Appendix A.

Table 2: Suggested times in mode and % of max. SHP for single engine turboshaft helicopters

GI1_Time (Min.)	TO_Time (Min.)	AP_Time (Min.)	GI2_Time (Min.)	GI1 %Power per engine	TO %Power per engine	AP % Power per engine	GI2 %Power per engine	Mean operating % power per engine
4.0	3.0	5.5	1.0	15	87	46	7	80

2.4 Twin Engine Turboshaft Helicopter Operations

For twin engine helicopters, the % power values per engine are normally lower than for single engine helicopters. At 100% rotor torque, the two engines are running at less than their 100% power rating[5]. This has been taken into account in table 3 (see Appendix B). It is suggested to first calculate the emissions of one engine based on the % power and times in mode below, followed by a multiplication of the results by a factor of 2.

Table 3: Suggested times in mode and % of max. SHP per engine for small twin engine turboshaft helicopters (below 3.4 tons MTOM)

GI1_Time (Min.)	TO_Time (Min.)	AP_Time (Min.)	GI2_Time (Min.)	GI1 %Power per engine	TO %Power per engine	AP % Power per engine	GI2 %Power per engine	Mean operating % power per engine
4.0	3.0	5.5	1.0	7	78	38	5	65

For large twin engine turboshaft helicopters it is suggested to further reduce the %power values (see Appendix C)

Table 4: Suggested times in mode and % of max. SHP per engine for large twin engine turboshaft helicopters (above 3.4 tons MTOM)

GI1_Time (Min.)	TO_Time (Min.)	AP_Time (Min.)	GI2_Time (Min.)	GI1 %Power per engine	TO %Power per engine	AP % Power per engine	GI2 %Power per engine	Mean operating % power per engine
4.0	3.0	5.5	1.0	6	66	32	5	62

3. Estimation of Fuel Flow and Emission Factors from Shaft Horsepower

The functions suggested in this section are based on the fitting of FOCA's own engine test data and on confidential engine manufacturer data. The documentation of this particular engine tests is not part of the current guidance, but will be referenced as soon as it is published. Manufacturer data are confidential and can not be published together with a corresponding engine name.

The main concept consists of entering a SHP value into the formulas and getting fuel flow (kg/s) and the emission factors for the standard pollutants (EI NO_x (g/kg), EI HC (g/kg), EI CO (g/kg) and EI PM $_{\text{non volatile}}$ (g/kg))[6]. The following steps are recommended:

[5] Generally, if an engine should fail, the remaining engine can restore nearly the twin engine performance (depending on the helicopter model).

[6] NO_x = Nitrogen oxides, HC = unburned hydrocarbons (unburned fuel), CO = Carbon monoxide, PM non volatile = Non volatile ultra fine particles, generally soot

- Firstly, the practitioner need to determine the maximum SHP of the engine(s) of the selected helicopter. The information can be found in publicly available helicopter or engine spec sheets or in helicopter operating manuals.
- Secondly, the helicopter category (piston, single turboshaft, twin turboshaft) has to be determined. With the corresponding table in section 2, the estimated SHP for the different operating modes of that helicopter engine are calculated.
- Next, the mode related SHPs are entered into the corresponding approximation functions, suggested in this section. The results are fuel flow and emission factors estimations for all modes of that particular helicopter.
- Finally, fuel flow and emission factors are combined with time in mode (from the appropriate table in section 2) to generate kg of fuel and grams emissions for LTO and one hour operation (see next section 4).

Due to a substantial variability of real measured emissions data between different engine types, the suggested general approximation functions for emissions may still lead to an error of a factor of two or more for a specific engine (see Appendix F). For fuel flow, the error is assumed +- 15%. The suggested formulas are representing the current state of knowledge. With additional data, a further refinement and improvement of the approximations would be possible.

3.1 Piston Engines

- Fuel flow (kg/s) ≈

  $1.9*10^{-12}* SHP^4 - 10^{-9}*SHP^3 + 2.6*10^{-7}*SHP^2 + 4*10^{-5}*SHP + 0.006$

- Emission factors for NO_x

  Table 5

Mode	GI1	TO	AP	GI2	CRUISE
% max. SHP	20%	95%	60%	20%	90%
EI NOx (g/kg)	1	1	4	1	2

- Emission factors for HC

  EI HC (g/kg) ≈ $80 * SHP^{-0.35}$

- Emission factors for CO

  EI CO (g/kg) ≈ 1000 (for all SHP)

- Emission factors for PM (non volatile particles, soot)

  Table 6

Mode	GI1	TO	AP	GI2	CRUISE
% max. SHP	20%	95%	60%	20%	90%
EI PM (g/kg)	0.05	0.1	0.04	0.05	0.07

All data for approximations of fuel flow and emission factors are taken from FOCA project ECERT. A graphical representation of approximation functions can be found in Appendix E.

3.2 Turboshaft Engines

- Fuel flow for engines above 1000 SHP

  Fuel flow (kg/s) ≈

  $4.0539 * 10^{-18} * SHP^5 - 3.16298 * 10^{-14} * SHP^4 + 9.2087 * 10^{-11} * SHP^3 - 1.2156 * 10^{-7} * SHP^2 + 1.1476 * 10^{-4} * SHP + 0.01256$

- Fuel flow for engines above 600 SHP and maximum 1000 SHP

  Fuel flow (kg/s) ≈

  $3.3158 * 10^{-16} * SHP^5 - 1.0175 * 10^{-12} * SHP^4 + 1.1627 * 10^{-9} * SHP^3 - 5.9528 * 10^{-7} * SHP^2 + 1.8168 * 10^{-4} * SHP + 0.0062945$

- Fuel flow for engines up to 600 SHP

  Fuel flow (kg/s) ≈

  $2.197 * 10^{-15} * SHP^5 - 4.4441 * 10^{-12} * SHP^4 + 3.4208 * 10^{-9} * SHP^3 - 1.2138 * 10^{-6} * SHP^2 + 2.414 * 10^{-4} * SHP + 0.004583$

- Emission factors for NO_x

  EI NO_x (g/kg) ≈ $0.2113 * (SHP)^{0.5677}$

- Emission factors for HC

  EI HC (g/kg) ≈ $3819 * (SHP)^{-1.0801}$

- Emission factors for CO

  EI CO (g/kg) ≈ $5660 * (SHP)^{-1.11}$

- Emission factors for PM (non volatile particles, soot)

  EI PM non volatile (g/kg) ≈ $-4.8 * 10^{-8} * SHP^2 + 2.3664 * 10^{-4} * SHP + 0.1056$

A graphical representation of approximation functions can be found in Appendix F.

4. Final Calculations

4.1 LTO Emissions

LTO fuel = 60 * (GI1_Time * GI1 fuel flow + TO_Time * TO fuel flow + AP_Time * AP fuel flow + GI2_Time * GI2 fuel flow) * number of engines

Remark: The factor of 60 converts minutes to seconds, as the times in the tables of section 2 are given in minutes but the estimated fuel flow values are in kg per second (see sections 2 and 3 of this guidance material)

LTO NO_x = 60 * (GI1_Time * GI1 fuel flow * GI1_EI NO_x + TO_Time * TO fuel flow * TO EI NO_x + AP_Time * AP fuel flow * AP EI NO_x + GI2_Time * GI2 fuel flow * GI2 EI NO_x) * number of engines

LTO HC, CO and PM are calculated accordingly by replacement of EI NO_x by EI HC, EI CO or EI PM.

4.2 Emissions for One Hour Operation

Fuel for one hour operation =

3600 * (fuel flow for mean operating power per engine) * number of engines

NO_x emissions for one hour operation =

3600 * (fuel flow for mean operating power per engine) * (EI NO_x for mean operating power per engine) * number of engines

HC, CO and PM emissions for one hour operation are calculated accordingly.

5. Helicopter Emissions Table

Based on this guidance material, estimated LTO emissions and emissions for one hour operation have been calculated for a variety of helicopters. The table is offered for direct application in emission inventories, for example by matching helicopter tail numbers with the emission results for the corresponding helicopter types contained in the table. The original excel file, containing all input data and calculation formulas can be downloaded from the FOCA Web page from May 2009 (www.bazl.admin.ch → for specialists → environment → aircraft engine emissions).
As far as fuel consumption and emissions for one hour operation (respectively cruise) are concerned, the results have been scaled in a range of about +-15% for some of the helicopters according to information from operators. This procedure allows to more accurately reflecting differences between different helicopter models. With more information expected from operators in the future, the scaling factors will be updated. For details about current one hour operation scaling factors, see Appendix D.

Table 7: Estimated LTO emissions and one hour operation emissions for different helicopter models.

					LTO Emissions					One hour emissions				
Aircraft_ ICAO	Aircraft_Name	Engine_Name	Max SHP per engine	Number_of_ Engines	LTO fuel (kg)	LTO NOx (g)	LTO HC (g)	LTO CO (g)	LTO PM non volatile (g)	One hour fuel (kg)	One hour NOx (kg)	One hour HC (kg)	One hour CO (kg)	One hour PM non vol. (kg)
A109	AGUSTA A109	DDA250-C20R/1	450	2	33.8	139	952	1252	5	210	1.11	1.74	2.17	0.036
A109	AGUSTA A109E	PW206C	550	2	37.1	172	841	1100	6	209	1.24	1.40	1.74	0.039
A109	AGUSTA A109	PW207C	650	2	41.6	212	779	1013	7	237	1.55	1.32	1.63	0.047
A109	AGUSTA A109 K2	ARRIEL1K1	738	2	44.4	245	720	933	8	255	1.79	1.24	1.53	0.053
A109	AGUSTA A109 Power	ARRIUS 2K	670	2	42.2	220	765	993	7	241	1.60	1.30	1.60	0.048
A109	AGUSTA A109A II	DDA250-C20B	420	2	32.8	130	994	1310	5	204	1.04	1.82	2.28	0.034
A109	AGUSTA A109C	DDA250-C20R	450	2	33.8	139	952	1252	5	210	1.11	1.74	2.17	0.036
A119	AGUSTA A119	PT6B-37	900	1	28.5	193	241	305	6	192	1.70	0.60	0.73	0.048
A139	AGUSTA A139	PT6C-67C	1100	2	60.3	376	753	968	12	412	3.54	1.37	1.67	0.101
ALO2	ALOUETTE II	ARTOUSTE IIC5	402	1	18.2	76	384	498	3	110	0.61	0.82	1.02	0.019
ALO2	ALOUETTE II	ARTOUSTE IIC6	402	1	18.2	76	384	498	3	110	0.61	0.82	1.02	0.019
ALO3	SA316B ALOUETTE III	ARTOUSTE IIIB	563	1	21.4	109	312	401	4	135	0.91	0.70	0.87	0.027
ALO3	SA316B ALOUETTE III	ASTAZOU XIVB	590	1	21.9	115	303	389	4	139	0.97	0.69	0.85	0.029
AS32	SUPER PUMA	MAKILA 1A1	1820	2	77.4	652	540	683	19	491	5.60	0.95	1.14	0.153
AS35	AS 350 B3	ARRIEL 2B	848	1	27.5	179	249	316	6	152	1.30	0.51	0.62	0.037
AS35	AS 350 B3	ARRIEL 2B1	848	1	27.5	179	249	316	6	152	1.30	0.51	0.62	0.037
AS35	AS 350 ECUREUIL	ARRIEL 1B	641	1	23.5	129	294	375	4	133	0.97	0.60	0.74	0.029
AS35	AS 350B ECUREUIL	ARRIEL 1D1	732	1	25.2	150	271	346	5	147	1.15	0.57	0.70	0.033
AS50	AS 550 FENNEC	ARRIEL 1D1	732	1	25.2	150	271	346	5	147	1.15	0.57	0.70	0.033
AS55	AS 355	DDA250-C20F	420	2	32.8	130	994	1310	5	204	1.04	1.82	2.28	0.034
AS55	AS 355 N	ARRIUS 1A	480	2	34.8	149	914	1200	5	216	1.19	1.67	2.08	0.038
AS55	AS 555 FENNEC	ARRIEL 1D1	712	2	43.6	235	736	955	8	277	1.91	1.40	1.73	0.057
AS65	AS 365 C1 DAUPHIN	ARRIEL 1A1	641	2	41.3	209	786	1023	7	261	1.69	1.48	1.83	0.051
AS65	AS 365 C2 DAUPHIN	ARRIEL 1A2	641	2	41.3	209	786	1023	7	261	1.69	1.48	1.83	0.051
AS65	AS 365 N DAUPHIN	ARRIEL 1C	660	2	41.9	216	772	1003	7	265	1.75	1.45	1.80	0.053
AS65	AS 365 N1 DAUPHIN	ARRIEL 1C1	700	2	43.2	231	744	965	8	274	1.87	1.41	1.74	0.056
AS65	AS 365 N3 DAUPHIN	ARRIEL 2C	839	2	47.7	285	667	860	9	309	2.34	1.31	1.60	0.068
B06	BELL 206B	DDA250-C20	400	1	18.2	75	385	499	3	109	0.61	0.82	1.03	0.019
B06	BELL 206B	DDA250-C20B	420	1	18.6	79	373	484	3	101	0.58	0.72	0.90	0.018
B06	BELL 206B	DDA250-C20J	420	1	18.6	79	373	484	3	101	0.58	0.72	0.90	0.018
B06	BELL 206B	DDA250-C20R	450	1	19.2	85	358	463	3	105	0.63	0.70	0.86	0.019
B06	BELL 206B	DDA250-C20R/4	450	1	19.2	85	358	463	3	105	0.63	0.70	0.86	0.019
B06	BELL 206L	DDA250-C20R	450	1	19.2	85	358	463	3	117	0.70	0.77	0.96	0.022
B06	BELL 206L	DDA250-C30	650	1	23.7	131	291	372	4	149	1.10	0.66	0.82	0.032
B06	BELL 206L	DDA250-C30P	650	1	23.7	131	291	372	4	149	1.10	0.66	0.82	0.032
B06T	Bell TWIN RANGER	DDA250-C20R	450	2	33.8	139	952	1252	5	210	1.11	1.74	2.17	0.036
B105	BO 105	DDA250-C20	400	2	32.1	123	1025	1353	5	200	0.99	1.88	2.36	0.033
B105	BO 105	DDA250-C20B	420	2	32.8	130	994	1310	5	204	1.04	1.82	2.28	0.034
B222	BELL 222	DDA250-C40B	715	2	43.7	236	734	952	8	278	1.92	1.40	1.72	0.057
B222	BELL 222	LTS101-750C.1	735	2	44.3	244	722	935	8	283	1.98	1.38	1.70	0.059

Table 7: (Continued). Green shaded lines are piston engine powered helicopters.

					LTO Emissions					One hour emissions				
Aircraft_ ICAO	Aircraft_Name	Engine_Name	Max SHP per engine	Number_of_ Engines	LTO fuel (kg)	LTO NOx (g)	LTO HC (g)	LTO CO (g)	LTO PM non volatile (g)	One hour fuel (kg)	One hour NOx (kg)	One hour HC (kg)	One hour CO (kg)	One hour PM non vol. (kg)
B407	Bell 407	DDA250-C47B	650	1	23.7	131	291	372	4	149	1.10	0.66	0.82	0.032
B412	Bell 412	PT6T-3	1800	2	77.0	644	544	688	19	541	6.14	1.06	1.27	0.168
B430	Bell 430	DDA250-C40B	715	2	43.7	236	734	952	8	278	1.92	1.40	1.72	0.057
BK17	BK117	ARRIEL 1E2	738	2	44.4	245	720	933	8	283	1.99	1.38	1.70	0.059
BK17	BK117 C-2	ARRIEL 1E2	738	2	44.4	245	720	933	8	283	1.99	1.38	1.70	0.059
BK17	BK117B	LTS101-750B.1	727	2	44.1	241	727	942	8	281	1.96	1.39	1.71	0.058
EC20	EC 120	ARRIUS 2F	432	1	18.8	82	367	475	3	114	0.67	0.79	0.98	0.021
EC30	EC 130 B4	ARRIEL 2B1	848	1	27.5	179	249	316	6	183	1.56	0.61	0.74	0.045
EC35	EC 135	ARRIUS 2B1	633	2	41.1	206	792	1031	7	259	1.67	1.49	1.84	0.051
EC35	EC 135	ARRIUS 2B2	633	2	41.1	206	792	1031	7	259	1.67	1.49	1.84	0.051
EC55	EC 155 B	ARRIEL 2C1	839	2	47.7	285	667	860	9	309	2.34	1.31	1.60	0.068
EC55	EC 155 B1	ARRIEL 2C2	944	2	51.0	328	622	800	10	337	2.73	1.26	1.54	0.079
EN48	ENSTROM 480	DDA250-C20W	420	1	18.6	79	373	484	3	112	0.64	0.80	1.00	0.020
EXPL	MD 900	PW206A	621	2	40.7	202	802	1045	7	257	1.64	1.50	1.86	0.050
GAZL	SA341 GAZELLE	ASTAZOU IIIA	644	1	23.5	130	293	374	4	148	1.09	0.67	0.82	0.032
GAZL	SA341 GAZELLE	ASTAZOU IIIN2	644	1	23.5	130	293	374	4	148	1.09	0.67	0.82	0.032
GAZL	SA342 GAZELLE	ASTAZOU XIVG	590	1	21.9	115	303	389	4	139	0.97	0.69	0.85	0.029
GAZL	SA342 GAZELLE	ASTAZOU XIVH	590	1	21.9	115	303	389	4	139	0.97	0.69	0.85	0.029
H500	HUGHES 500	DDA250-C18	317	1	16.4	60	446	582	2	99	0.48	0.96	1.20	0.016
H500	HUGHES 501	DDA250-C20B	420	1	18.6	79	373	484	3	112	0.64	0.80	1.00	0.020
H500	MD 500N	DDA250-C20R	450	1	19.2	85	358	463	3	117	0.70	0.77	0.96	0.022
H53	SIKORSKY CH-53G (S-65)	T 64-GE-7	3925	2	125.4	1690	351	433	41	977	17.27	0.82	0.96	0.388
H53S	SIKORSKY SUPER STALLION	T 64-GE-7	3925	3	188.0	2535	526	649	62	1332	21.99	1.27	1.50	0.523
H60	SIKORSKY BLACK HAWK	T700-GE-700	1622	2	72.8	573	581	737	17	508	5.43	1.11	1.34	0.150
KA27	KA-32A12	TV3-117VMA	2200	2	86.2	815	481	605	23	621	7.90	0.98	1.17	0.211
KMAX	K-1200	T53 17A-1	1500	1	43.4	391	210	261	11	284	3.36	0.51	0.61	0.091
LAMA	SA315B LAMA	ARTOUSTE IIIB	563	1	21.4	109	312	401	4	159	1.08	0.83	1.02	0.032
MD52	MD 520N	DDA250-C20	400	1	18.2	75	385	499	3	109	0.61	0.82	1.03	0.019
MD60	MD 600N	DDA250-C47M	650	1	23.7	131	291	372	4	149	1.10	0.66	0.82	0.032
MI8	MIL MI-8	TV2-117	1500	2	70.0	525	611	778	16	485	4.97	1.15	1.39	0.138
S76	SIKORSKY S76	DDA250-C30S	650	2	41.6	212	779	1013	7	263	1.72	1.46	1.81	0.052
S76	SIKORSKY S76	PT6B-36A	981	2	52.2	343	609	782	11	348	2.87	1.24	1.52	0.082
S76	SIKORSKY S-76 C+	ARRIEL 2S1	856	2	48.2	291	659	850	9	313	2.40	1.30	1.59	0.070
S92	SIKORSKY S92A	GE CT7-8A	2740	2	98.5	1066	424	529	29	735	10.59	0.91	1.08	0.271
UH1	BELL UH-1H	T53 L13	1400	1	41.8	361	218	273	10	271	3.09	0.53	0.63	0.084
UH12	HILLER UH-12A	VO-540-1B	320	1	12.3	26	157	12310	1	82	0.16	0.91	82.33	0.006
B47G	Bell 47G	LYC TVO-435-B1A	270	1	9.9	21	134	9873	1	65	0.13	0.76	64.62	0.005
B47G	Bell 47G-3B	LYC VO-435-A1D	220	1	7.8	16	114	7759	1	50	0.10	0.63	49.94	0.003
EN28	ENSTROM 280C	HIO-360	190	1	6.6	14	102	6591	0	42	0.08	0.56	42.00	0.003
EXEC	ROTORWAY EXEC 90	ROTORWAY RI-162	150	1	5.1	11	87	5118	0	32	0.06	0.46	32.07	0.002
H269	SCHWEIZER 269C	HIO-360	190	1	6.6	14	102	6591	0	42	0.08	0.56	42.00	0.003
HU30	HUGHES 300	HIO-360	190	1	6.6	14	102	6591	0	42	0.08	0.56	42.00	0.003
R22	R22 BETA	HO-360	180	1	6.2	13	98	6214	0	39	0.08	0.53	39.46	0.003
R44	R44 RAVEN	HIO-540	245	1	8.8	18	124	8785	1	57	0.11	0.69	57.00	0.004
SCOR	ROTORWAY SCORPION	ROTORWAY RW 133	133	1	4.5	9	80	4519	0	28	0.06	0.42	28.04	0.002
SYCA	BRISTOL SYCAMORE	ALVIS LEONIDES	550	1	34.8	63	349	34826	3	277	0.55	2.52	276.80	0.019

References

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2) FOCA engine database (not publicly available)

3) FOI (Swedish Defence Research Agency) engine database for turboprop and turboshaft engines (not publicly available)

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12) Engine specifications GE Aviation

13) Control of air pollution from aircraft and aircraft engines, US Environmental Protection Agency, US federal register, Volume 38, Number 136, July 17, 1973

14) Helicopter Pictures © by B. Baur, FOCA, Switzerland

Appendix A: LTO data, cruise data and estimated emissions for a single engine turboshaft helicopter

SINGLE ENGINE TURBINE HELICOPTER LTO AND CRUISE DATA

HBXVA	19.02.2009

Type	AS350B2	
Engine	Arriel 1D1	
Ref. Power:		
100%T	732	SHP
94%T (MCP)	688	SHP
TOM	2020	kg (= 90% MTOM)
OM test end	1820	kg

LTO MODE	Time Incr. (Min)	Time sum (Min.)	Rotortorque %	SHP %	Engine N1 %	RoC RoD (ft/min)	Est. SHP	Est. FF (kg/s)	Est. EI NOx (g/kg)	Est. EI HC (g/kg)	Est. EI CO (g(kg)	Est. EI PM (g/kg)
GI	2	2	15	7	70	0	51	0.014	1.974	54.375	71.639	0.118
GR (full rotor RPM)	2	4	23	23	80.2	0	168	0.025	3.879	15.045	19.129	0.144
HOVER IGE	0.3	4.3	65	65	90.3	0	476	0.039	6.996	4.899	6.038	0.207
CL	2.5	6.8	90	90	95.8	1000	659	0.050	8.416	3.447	4.207	0.241

TO 5 NM	3.7	7.7
TO 3000ft	3	7

	Est. Fuel (kg)	Est NOx (g)	Est. HC (g)	Est. CO (g)	Est. PM (g)
GI	4.7	14.9	137.3	178.9	0.6
TO	8.1	67.5	29.1	35.5	1.9
Total 1	12.8	82.4	166.4	214.4	2.6

LTO MODE	Time Incr. (Min)	Time sum (Min.)	Rotortorque %	SHP %	Engine N1 %	RoC RoD (ft/min)	Est. SHP	Est. FF (kg/s)	Est. EI NOx (g/kg)	Est. EI HC (g/kg)	Est. EI CO (g/kg)	Est. EI PM (g/kg)
DCT	2.5	2.5	60	60		700	439	0.037	6.686	5.341	6.599	0.200
DCT	1	3.5	45	45		500	329	0.032	5.678	7.287	9.081	0.178
AP	0.7	4.2	30	30		500	220	0.028	4.511	11.292	14.243	0.155
FINAL	0.3	4.5	15	15	78	250	110	0.020	3.043	23.872	30.743	0.131
FINAL	0.7	5.2	20	20	80	250	146	0.023	3.583	17.496	22.339	0.139
HOVER IGE	0.3	5.5	60	60	89	0	439	0.037	6.686	5.341	6.599	0.200
GI	1	6.5	15	7	69	0	51	0.014	1.974	54.375	71.639	0.118

L 5NM	4.5	5.5
L 3000ft	5.5	6.5

	Est. Fuel (kg)	Est NOx (g)	Est. HC (g)	Est. CO (g)	Est. PM (g)
GI	0.9	1.7	46.3	61.0	0.1
AP	10.7	62.8	86.7	108.8	2.0
Total 2	11.6	64.5	133.0	169.8	2.1

TOTAL LTO	24.4	146.9	299.4	384.2	4.6

CRUISE and LTO MEAN

CR	Cruise	Mean Time (Min.)	Est. SHP	Est. Mean FF (kg/s)	Est. Mean EI NOx (g/kg)	Est. Mean EI HC (g/kg)	Est. Mean EI CO (g/kg)	Est. Mean EI PM (g/kg)
CR	**75%**	60	549	0.043	7.588	4.197	5.151	0.221
CR	**80%**	60	586	0.045	7.872	3.914	4.795	0.228
CR	**85%**	60	622	0.047	8.147	3.666	4.483	0.234
CR	**90%**	60	659	0.050	8.416	3.447	4.207	0.241

	Est. Mean Fuel (kg)	Est. Mean NOx (g)	Est. Mean HC (g)	Est. Mean CO (g)	Est. Mean PM (g)
75%	155	1178	651	799	34
80%	163	1281	637	781	37
85%	171	1389	625	765	40
90%	178	1501	615	751	43

LTO	Mean SHP %	Mean Time (Min.)	Est. SHP	Est. Mean FF (kg/s)	Est. Mean EI NOx (g/kg)	Est. Mean EI HC (g/kg)	Est. Mean EI CO (g/kg)	Est. Mean EI PM (g/kg)
GI	**15**	4	110	0.020	3.043	23.872	30.743	0.131
TO	**87**	2.8	639	0.048	8.273	3.561	4.351	0.237

	Est. Mean Fuel (kg)	Est. Mean NOx (g)	Est. Mean HC (g)	Est. Mean CO (g)	Est. Mean PM (g)
GI	4.9	14.9	117.2	151.0	0.6
TO	8.1	67.2	28.9	35.4	1.9
Total 1	13.0	82.2	146.2	186.3	2.6

LTO	Mean SHP %	Mean Time (Min.)	Est. SHP	Est. Mean FF (kg/s)	Est. Mean EI NOx (g/kg)	Est. Mean EI HC (g/kg)	Est. Mean EI CO (g/kg)	Est. Mean EI PM (g/kg)
AP	**46**	5.5	336	0.033	5.743	7.131	8.882	0.180
GI	**7**	1	51	0.014	1.974	54.375	71.639	0.118

	Est. Mean Fuel (kg)	Est. Mean NOx (g)	Est. Mean HC (g)	Est. Mean CO (g)	Est. Mean PM (k)
AP	10.8	62.0	76.9	95.8	1.9
GI	0.9	1.7	46.3	61.0	0.1
Total 2	11.6	63.6	123.2	156.8	2.0

TOTAL LTO	24.7	145.8	269.4	343.2	4.6

Appendix B: LTO data, measured fuel flow and estimated emissions for a small twin engine turboshaft helicopter (continued on next page)

TWIN ENGINE TURBINE HELICOPTER LTO DATA

HBXQE	12.02.2009

Type	A109	
Engine	PW206C	
Ref. Power:		
max. one engine	550	SHP
100% Rotor-Torque	900	SHP
MC per engine	450	SHP

TOM	2850	kg	(= MTOM)
OM test end	2650	kg	

LTO MODE	Time Incr. (Min)	Time sum (Min.)	Rotortorque %	Total SHP %	Engine 1 N1 %	Engine 2 N1 %	Engine 1 FF (kg/s)	Engine 2 FF (kg/s)	RoC RoD (ft/min)	Est. SHP per engine	Est. FF per engine (kg/s)	Est. EI NOx per engine (g/kg)	Est. EI HC per engine (g/kg)	Est. EI CO per engine (g/kg)	Est. EI PM per engine (g/kg)
GI	3.3	3.3	9	6	61.5	60.3	0.01	0.01	0	27	0.010	1.372	108.626	145.882	0.112
GR (full rotor RPM)	0.7	4	21	21	75.5	74.7	0.01583	0.01583	0	95	0.019	2.795	28.073	36.315	0.128
HOVER IGE	0	4							0	0					
CL	3	7	95	95	90.4	91.4	0.03333	0.03194	1000	428	0.036	6.584	5.499	6.800	0.198

					Meas. Total fuel (kg)			Est. Fuel (kg)	Est NOx (g)	Est. HC (g)	Est. CO (g)	Est. PM (g)
TO 5 NM	4	8		GI	5.3		GI	5.7	10.1	487.3	652.2	0.7
TO 3000ft	3	7		TO	11.7		TO	13.0	85.7	71.6	88.5	2.6
				Total 1	17.0		Total 1	18.7	95.8	558.9	740.7	3.2

LTO MODE	Time Incr. (Min)	Time sum (Min.)	Rotortorque %	Total SHP %	Engine 1 N1 %	Engine 2 N1 %	Engine 1 FF (kg/s)	Engine 2 FF (kg/s)	RoC RoD (ft/min)	Est. SHP per engine	Est. FF per engine (kg/s)	Est. EI NOx per engine (g/kg)	Est. EI HC per engine (g/kg)	Est. EI CO per engine (g/kg)	Est. EI PM per engine (g/kg)
DCT	2.5	2.5	60	60			0.0257	0.0257	700	270	0.028	5.072	9.033	11.324	0.166
DCT	1	3.5	45	45			0.0222	0.0222	500	203	0.025	4.308	12.325	15.584	0.152
AP	0.7	4.2	30	30			0.0167	0.0167	500	135	0.022	3.422	19.097	24.443	0.137
FINAL	0.3	4.5	15	15			0.0148	0.0148	250	68	0.016	2.309	40.376	52.758	0.121
FINAL	0.7	5.2	20	20			0.0158	0.0158	250	90	0.019	2.718	29.592	38.336	0.127
HOVER IGE	0.3	5.5	70	70			0.0275	0.0275	0	315	0.030	5.536	7.648	9.543	0.175
GI	1	6.5	8	6			0.01	0.01	0	27	0.010	1.372	108.626	145.882	0.112

					Meas. Total fuel (kg)			Est. Fuel (kg)	Est NOx (g)	Est. HC (g)	Est. CO (g)	Est. PM (g)
L 5NM	4.5	5.5		GI	1.2		GI	1.2	1.7	134.0	180.0	0.1
L 3000ft	5.5	6.5		TO	14.6		AP	16.6	73.9	227.7	289.9	2.6
				Total 1	15.8		Total 2	17.8	75.6	361.7	469.9	2.7
				TOTAL LTO	32.9		TOTAL LTO	36.5	171.4	920.6	1210.6	6.0

Appendix B: Weighted average LTO data, measured cruise fuel flow and estimated emissions for a small twin engine turboshaft helicopter

CR	Est. Total SHP	Mean Time (Min.)	**Est. SHP % per engine**	Est. SHP per engine	Est. Mean FF per engine (kg/s)	Est. Mean EI NOx per engine (kg/s)	Est. Mean EI HC per engine (kg/s)	Est. Mean EI CO per engine (kg/s)	Est. Mean EI PM per engine (kg/s)
75%	675	60	**61**	338	0.031	5.757	7.098	8.840	0.180
80%	720	60	**65**	360	0.032	5.972	6.620	8.228	0.185
85%	765	60	**70**	383	0.034	6.181	6.201	7.693	0.189
90%	810	60	**74**	405	0.035	6.385	5.830	7.220	0.194

Meas. Fuel (kg)
200

	Est. Mean Fuel (kg)	Est. Mean NOx (g)	Est. Mean HC (g)	Est. Mean CO (g)	Est. Mean PM (g)
75%	225	1296	1598	1990	41
80%	233	1394	1545	1921	43
85%	242	1497	1501	1863	46
90%	251	1603	1464	1813	49

LTO	Mean total SHP %	Mean Time (Min.)	**Mean est. SHP % per engine**	Mean est. SHP per engine	Est. Mean FF per engine (kg/s)	Est. Mean EI NOx per engine (g/kg)	Est. Mean EI HC per engine (g/kg)	Est. Mean EI CO per engine (g/kg)	Est. Mean EI PM per engine (g/kg)
GI	9	4	**7**	39	0.012	1.686	73.401	97.512	0.115
TO	95	3	**78**	428	0.036	6.584	5.499	6.800	0.198

	Est. Mean Fuel (kg)	Est. Mean NOx (g)	Est. Mean HC (g)	Est. Mean CO (g)	Est. Mean PM (g)
GI	5.9	10.0	433.9	576.4	0.7
TO	13.0	85.7	71.6	88.5	2.6
Total 1	18.9	95.7	505.4	664.9	3.3

LTO	Mean total SHP %	Mean Time (Min.)	**Mean est. SHP % per engine**	Mean est. SHP per engine	Est. Mean FF per engine (kg/s)	Est. Mean EI NOx per engine (g/kg)	Est. Mean EI HC per engine (g/kg)	Est. Mean EI CO per engine (g/kg)	Est. Mean EI PM per engine (g/kg)
AP	46	5.5	**38**	209	0.026	4.386	11.909	15.044	0.153
GI	6	1	**5**	27	0.010	1.372	108.626	145.882	0.112

	Est. Mean Fuel (kg)	Est. Mean NOx (g)	Est. Mean HC (g)	Est. Mean CO (g)	Est. Mean PM (g)
AP	16.9	74.2	201.5	254.6	2.6
GI	1.2	1.7	134.0	180.0	0.1
Total 2	18.2	75.9	335.6	434.6	2.7

TOTAL LTO	37.1	171.6	841.0	1099.4	6.0

CR	Est. Total SHP	Mean Time (Min.)	**Est. SHP % per engine**	Est. SHP per engine	Est. Mean FF per engine (kg/s)	Est. Mean EI NOx per engine (kg/s)	Est. Mean EI HC per engine (kg/s)	Est. Mean EI CO per engine (kg/s)	Est. Mean EI PM per engine (kg/s)
75%	675	60	**61**	338	0.031	5.757	7.098	8.840	0.180
80%	720	60	**65**	360	0.032	5.972	6.620	8.228	0.185
85%	765	60	**70**	383	0.034	6.181	6.201	7.693	0.189
90%	810	60	**74**	405	0.035	6.385	5.830	7.220	0.194

Meas. Fuel (kg)
200

	Est. Mean Fuel (kg)	Est. Mean NOx (g)	Est. Mean HC (g)	Est. Mean CO (g)	Est. Mean PM (g)
75%	225	1296	1598	1990	41
80%	233	1394	1545	1921	43
85%	242	1497	1501	1863	46
90%	251	1603	1464	1813	49

LTO	Mean total SHP %	Mean Time (Min.)	**Mean est. SHP % per engine**	Mean est. SHP per engine	Est. Mean FF per engine (kg/s)	Est. Mean EI NOx per engine (g/kg)	Est. Mean EI HC per engine (g/kg)	Est. Mean EI CO per engine (g/kg)	Est. Mean EI PM per engine (g/kg)
GI	9	4	**7**	39	0.012	1.679	74.045	98.391	0.115
TO	92	3	**75**	413	0.035	6.452	5.715	7.075	0.195

	Est. Mean Fuel (kg)	Est. Mean NOx (g)	Est. Mean HC (g)	Est. Mean CO (g)	Est. Mean PM (g)
GI	5.9	9.9	437.7	581.6	0.7
TO	12.7	84.0	74.4	92.1	2.5
Total 1	18.6	93.9	512.0	673.6	3.2

LTO	Mean total SHP %	Mean Time (Min.)	**Mean est. SHP % per engine**	Mean est. SHP per engine	Est. Mean FF per engine (kg/s)	Est. Mean EI NOx per engine (g/kg)	Est. Mean EI HC per engine (g/kg)	Est. Mean EI CO per engine (g/kg)	Est. Mean EI PM per engine (g/kg)
AP	43	5.5	**35**	193	0.025	4.186	13.018	16.485	0.149
GI	9	1	**7**	39	0.012	1.679	74.045	98.391	0.115

	Est. Mean Fuel (kg)	Est. Mean NOx (g)	Est. Mean HC (g)	Est. Mean CO (g)	Est. Mean PM (g)
AP	16.5	70.8	220.3	279.0	2.5
GI	1.5	2.1	91.3	121.4	0.1
Total 2	17.9	72.9	311.7	400.4	2.7

TOTAL LTO	36.5	166.8	823.7	1074.0	5.9

Appendix C: LTO data, measured fuel flow and estimated emissions for a large twin engine turboshaft helicopter (continued on next page)

TWIN ENGINE TURBINE HELICOPTER LTO DATA

HBXQE	12.01.2009

Type	AS32	
Engine	MAKILA 1A1	
Ref. Power:		
max. one engine	1820	SHP
100% Rotor-Torque	2996	SHP
MC per engine	1589	SHP

TOM	7600	kg	(= MTOM)
OM test end		kg	

LTO MODE	Time Incr. (Min)	Time sum (Min.)	Rotortorque %	Total SHP %	Engine 1 N1 %	Engine 2 N1 %	Engine 1 FF (kg/s)	Engine 2 FF (kg/s)	RoC RoD (ft/min)	Est. SHP per engine	Est. FF per engine (kg/s)	Est. EI NOx per engine (g/kg)	Est. EI HC per engine (g/kg)	Est. EI CO per engine (g/kg)	Est. EI PM per engine (g/kg)
GI	3.3	3.3	7	5.8	65	65	0.0233	0.0233	0	87	0.022	2.665	30.740	39.865	0.027
GR (full rotor RPM)	0.7	4	15	15	75	75	0.0375	0.0375	0	225	0.033	4.570	11.015	13.885	0.069
HOVER IGE	0.1	4.1	64	64	90	90	0.0653	0.0653	0	959					
CL	3	7.1	81	81	90.3	90.1	0.075	0.075	1000	1213	0.079	11.904	1.782	2.136	0.300

				Meas. Total fuel (kg)			Est. Fuel (kg)	Est NOx (g)	Est. HC (g)	Est. CO (g)	Est. PM (g)
TO 5 NM	4	8	GI	12.4		GI	11.4	35.6	294.5	380.8	0.4
TO 3000ft	3	7	TO	27.8		TO	28.6	340.4	51.0	61.1	8.6
			Total 1	40.2		Total 1	40.0	376.1	345.5	441.9	9.0

LTO MODE	Time Incr. (Min)	Time sum (Min.)	Rotortorque %	Total SHP %	Engine 1 N1 %	Engine 2 N1 %	Engine 1 FF (kg/s)	Engine 2 FF (kg/s)	RoC RoD (ft/min)	Est. SHP per engine	Est. FF per engine (kg/s)	Est. EI NOx per engine (g/kg)	Est. EI HC per engine (g/kg)	Est. EI CO per engine (g/kg)	Est. EI PM per engine (g/kg)
DCT	2.5	2.5	45	45	84.2	84.5	0.0542	0.0542	700	674	0.057	8.526	3.362	4.101	0.188
DCT	1	3.5	41	41	83.9	83.2	0.05	0.05	500	614	0.054	8.088	3.718	4.548	0.174
AP	0.7	4.2	30	30			0.047	0.047	500	449	0.047	6.773	5.210	6.433	0.132
FINAL	0.3	4.5	15	15			0.0375	0.0375	250	225	0.033	4.570	11.015	13.885	0.069
FINAL	0.7	5.2	20	20			0.04	0.04	250	300	0.038	5.381	8.073	10.089	0.090
HOVER IGE	0.3	5.5	65	65			0.066	0.066	0	974	0.069	10.506	2.260	2.727	0.255
GI	1	6.5	7	5.8			0.0233	0.0233	0	87	0.022	2.665	30.740	39.865	0.027

				Meas. Total fuel (kg)			Est. Fuel (kg)	Est NOx (g)	Est. HC (g)	Est. CO (g)	Est. PM (g)
L 5NM	4.5	5.5	GI	2.8		GI	2.6	6.9	79.9	103.7	0.1
L 3000ft	5.5	6.5	TO	33.3		AP	34.4	273.9	146.9	180.8	5.9
			Total 1	36.1		Total 2	37.0	280.8	226.8	284.4	5.9
			TOTAL LTO	76.3		TOTAL LTO	77.0	656.9	572.3	726.3	15.0

Appendix C: Weighted average LTO data, measured cruise fuel flow and estimated emissions for a large twin engine turboshaft helicopter

CRUISE and LTO MEAN

CR	Est. Total SHP	Mean Time (Min.)	**Est. SHP % per engine**	Est. SHP per engine	Est. Mean FF per engine (kg/s)	Est. Mean EI NOx per engine (g/kg)	Est. Mean EI HC per engine (g/kg)	Est. Mean EI CO per engine (g/kg)	Est. Mean EI PM per engine (g/kg)	
75%	2247	60	**62**	1124	0.076	11.395	1.937	2.326	0.284	
80%	2397	60	**66**	1198	0.079	11.820	1.806	2.166	0.297	
85%	2547	60	**70**	1273	0.082	12.234	1.692	2.025	0.310	**NOT**
90%	2696	60	**74**	1348	0.086	12.637	1.590	1.900	0.322	**PRACTICAL**

Operating Mass (kg)	Meas. Fuel (kg)
7600 (light)	480

	Est. Mean Fuel (kg)	Est. Mean NOx (g)	Est. Mean HC (g)	Est. Mean CO (g)	Est. Mean PM (g)	
75%	544	6195	1053	1265	154	
80%	567	6705	1024	1228	169	
85%	591	7234	1000	1197	183	**NOT**
90%	616	7784	980	1170	199	**PRACTICAL**

LTO	Mean total SHP %	Mean Time (Min.)	**Mean est. SHP % per engine**	Mean est. SHP per engine	Est. Mean FF per engine (kg/s)	Est. Mean EI NOx per engine (g/kg)	Est. Mean EI HC per engine (g/kg)	Est. Mean EI CO per engine (g/kg)	Est. Mean EI PM per engine (g/kg)
GI	7	4	**6**	111	0.024	3.062	23.593	30.374	0.035
TO	80	3.1	**66**	1205	0.079	11.858	1.795	2.152	0.299

	Est. Mean Fuel (kg)	Est. Mean NOx (g)	Est. Mean HC (g)	Est. Mean CO (g)	Est. Mean PM (g)
GI	11.5	35.2	270.9	348.8	0.4
TO	29.4	348.8	52.8	63.3	8.8
Total 1	40.9	384.0	323.7	412.1	9.2

LTO	Mean total SHP %	Mean Time (Min.)	**Mean est. SHP % per engine**	Mean est. SHP per engine	Est. Mean FF per engine (kg/s)	Est. Mean EI NOx per engine (g/kg)	Est. Mean EI HC per engine (g/kg)	Est. Mean EI CO per engine (g/kg)	Est. Mean EI PM per engine (g/kg)
AP	39	5.5	**32**	579	0.053	7.819	3.964	4.858	0.165
GI	5.8	1	**5**	87	0.022	2.665	30.740	39.865	0.027

	Est. Mean Fuel (kg)	Est. Mean NOx (g)	Est. Mean HC (g)	Est. Mean CO (g)	Est. Mean PM (g)
AP	34.9	272.6	138.2	169.4	5.8
GI	2.6	6.9	79.9	103.7	0.1
Total 2	37.5	279.6	218.2	273.0	5.8
TOTAL LTO	78.4	663.6	541.9	685.1	15.0

CRUISE and LTO MODEL

CR	Est. Total SHP	Mean Time (Min.)	**Est. SHP % per engine**	Est. SHP per engine	Est. Mean FF per engine (kg/s)	Est. Mean EI NOx per engine (g/kg)	Est. Mean EI HC per engine (g/kg)	Est. Mean EI CO per engine (g/kg)	Est. Mean EI PM per engine (g/kg)
75%	2247	60	**62**	1124	0.076	11.395	1.937	2.326	0.284
80%	2397	60	**66**	1198	0.079	11.820	1.806	2.166	0.297
85%	2547	60	**70**	1273	0.082	12.234	1.692	2.025	0.310
90%	2696	60	**74**	1348	0.086	12.637	1.590	1.900	0.322

Operating Mass (kg)	Meas. Fuel (kg)
7600 (light)	480

	Est. Mean Fuel (kg)	Est. Mean NOx (g)	Est. Mean HC (g)	Est. Mean CO (g)	Est. Mean PM (g)
75%	544	6195	1053	1265	154
80%	567	6705	1024	1228	169
85%	591	7234	1000	1197	183
90%	616	7784	980	1170	199

LTO	Mean total SHP %	Mean Time (Min.)	**Mean est. SHP % per engine**	Mean est. SHP per engine	Est. Mean FF per engine (kg/s)	Est. Mean EI NOx per engine (g/kg)	Est. Mean EI HC per engine (g/kg)	Est. Mean EI CO per engine (g/kg)	Est. Mean EI PM per engine (g/kg)
GI	9	4	**7**	127	0.025	3.311	20.331	26.066	0.040
TO	91	3	**75**	1365	0.086	12.727	1.569	1.874	0.325

	Est. Mean Fuel (kg)	Est. Mean NOx (g)	Est. Mean HC (g)	Est. Mean CO (g)	Est. Mean PM (g)
GI	12.2	38.0	233.5	299.3	0.5
TO	31.1	374.4	46.2	55.1	9.6
Total 1	43.3	412.4	279.6	354.4	10.0

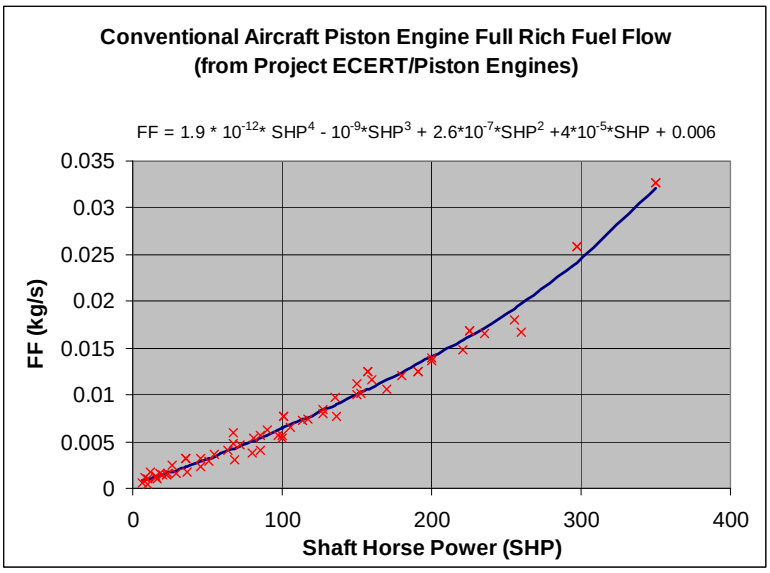
LTO	Mean total SHP %	Mean Time (Min.)	**Mean est. SHP % per engine**	Mean est. SHP per engine	Est. Mean FF per engine (kg/s)	Est. Mean EI NOx per engine (g/kg)	Est. Mean EI HC per engine (g/kg)	Est. Mean EI CO per engine (g/kg)	Est. Mean EI PM per engine (g/kg)
AP	43	5.5	**35**	637	0.055	8.257	3.574	4.367	0.179
GI	9	1	**7**	127	0.025	3.311	20.331	26.066	0.040

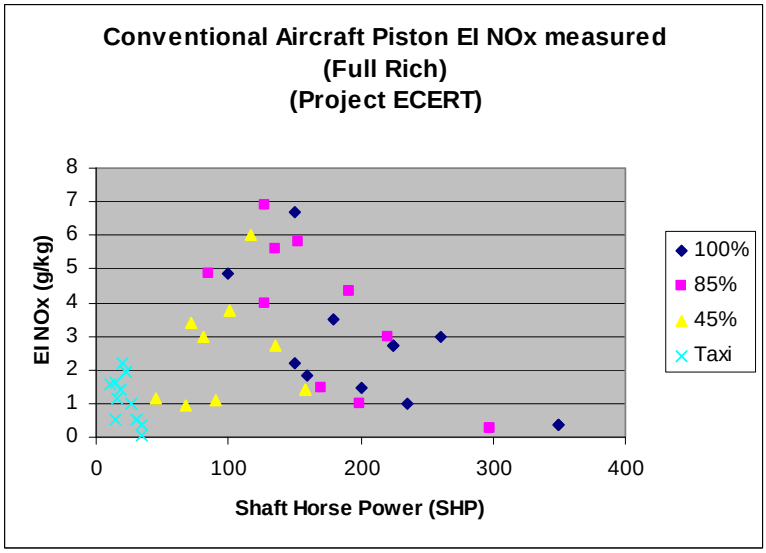
	Est. Mean Fuel (kg)	Est. Mean NOx (g)	Est. Mean HC (g)	Est. Mean CO (g)	Est. Mean PM (g)
AP	36.5	287.9	124.6	152.3	6.3
GI	3.0	8.6	52.9	67.8	0.1
Total 2	39.6	296.5	177.5	220.1	6.4
TOTAL LTO	82.8	708.9	457.1	574.5	16.4

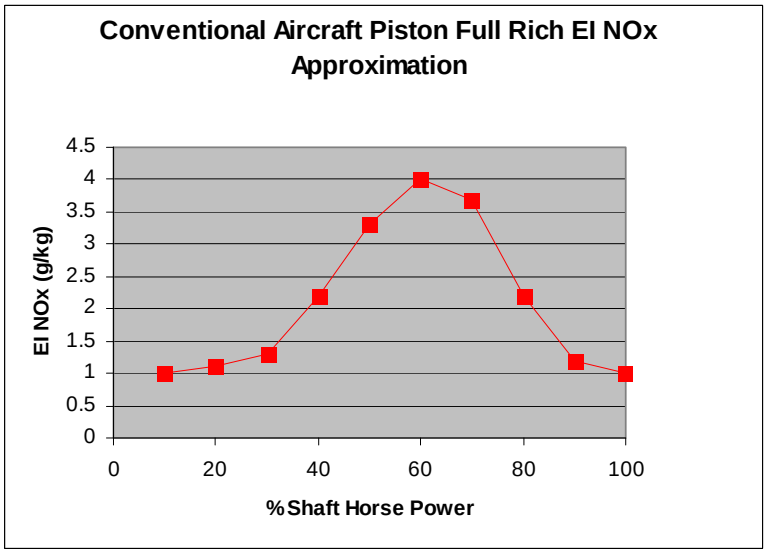
Appendix D: Estimated one hour operation emissions and indicated scale factors (status March 2009). Example: Scale factor 0.9 means that the estimated one hour fuel and emissions have been multiplied by a factor of 0.9

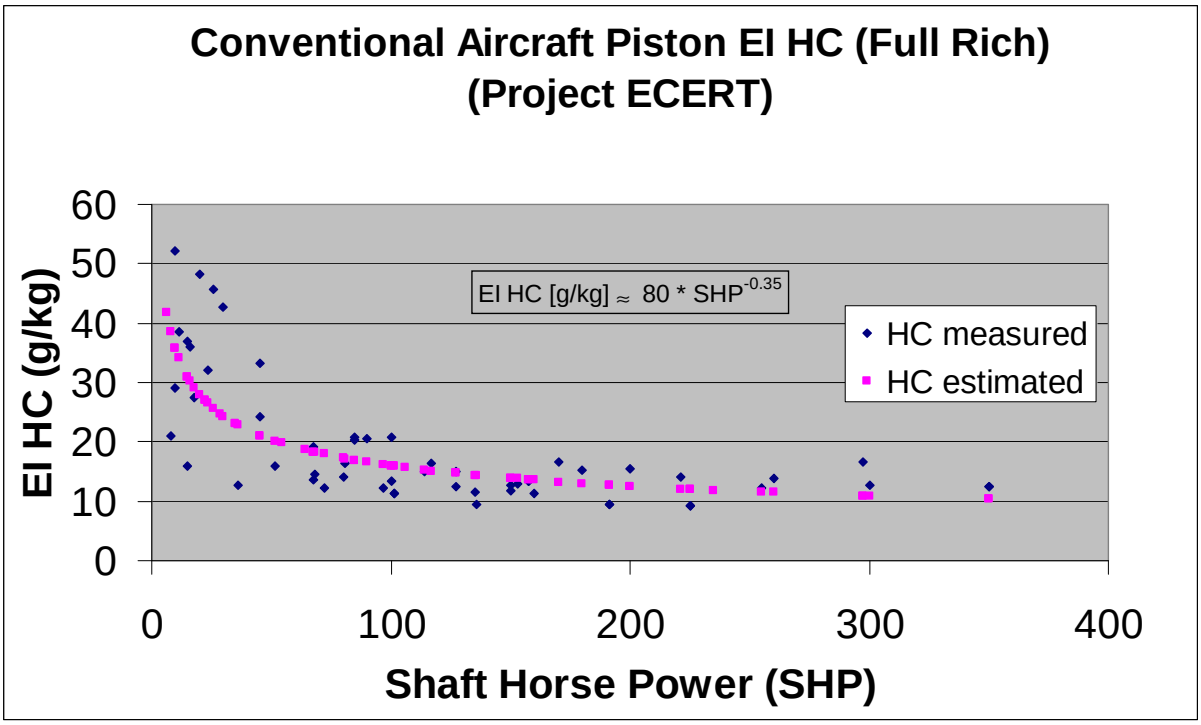
					One hour emissions				
Code	Aircraft_ICAO	Aircraft_Name	Engine_Name	Mean operating helicopter specific scale factor	One hour fuel (kg)	One hour NOx (kg)	One hour HC (kg)	One hour CO (kg)	One hour PM non vol. (kg)
H001	A109	AGUSTA A109	DDA250-C20R/1	1	210	1.11	1.74	2.17	0.036
H021	A109	AGUSTA A109E	PW206C	0.9	209	1.24	1.40	1.74	0.039
H001	A109	AGUSTA A109	PW207C	0.9	237	1.55	1.32	1.63	0.047
H001	A109	AGUSTA A109 K2	ARRIEL1K1	0.9	255	1.79	1.24	1.53	0.053
H001	A109	AGUSTA A109 Power	ARRIUS 2K	0.9	241	1.60	1.30	1.60	0.048
H001	A109	AGUSTA A109A II	DDA250-C20B	1	204	1.04	1.82	2.28	0.034
H001	A109	AGUSTA A109C	DDA250-C20R	1	210	1.11	1.74	2.17	0.036
H013	A119	AGUSTA A119	PT6B-37	1	192	1.70	0.60	0.73	0.048
H002	A139	AGUSTA A139	PT6C-67C	1	412	3.54	1.37	1.67	0.101
H001	ALO2	ALOUETTE II	ARTOUSTE IIC5	1	110	0.61	0.82	1.02	0.019
H001	ALO2	ALOUETTE II	ARTOUSTE IIC6	1	110	0.61	0.82	1.02	0.019
H001	ALO3	SA316B ALOUETTE III	ARTOUSTE IIIB	1	135	0.91	0.70	0.87	0.027
H001	ALO3	SA316B ALOUETTE III	ASTAZOU XIVB	1	139	0.97	0.69	0.85	0.029
HF30	AS32	SUPER PUMA	MAKILA 1A1	0.9	491	5.60	0.95	1.14	0.153
H001	AS35	AS 350 B3	ARRIEL 2B	0.83	152	1.30	0.51	0.62	0.037
H001	AS35	AS 350 B3	ARRIEL 2B1	0.83	152	1.30	0.51	0.62	0.037
H001	AS35	AS 350 ECUREUIL	ARRIEL 1B	0.9	133	0.97	0.60	0.74	0.029
H001	AS35	AS 350B ECUREUIL	ARRIEL 1D1	0.9	147	1.15	0.57	0.70	0.033
H001	AS50	AS 550 FENNEC	ARRIEL 1D1	0.9	147	1.15	0.57	0.70	0.033
H001	AS55	AS 355	DDA250-C20F	1	204	1.04	1.82	2.28	0.034
H001	AS55	AS 355 N	ARRIUS 1A	1	216	1.19	1.67	2.08	0.038
H001	AS55	AS 555 FENNEC	ARRIEL 1D1	1	277	1.91	1.40	1.73	0.057
H001	AS65	AS 365 C1 DAUPHIN	ARRIEL 1A1	1	261	1.69	1.48	1.83	0.051
H001	AS65	AS 365 C2 DAUPHIN	ARRIEL 1A2	1	261	1.69	1.48	1.83	0.051
H001	AS65	AS 365 N DAUPHIN	ARRIEL 1C	1	265	1.75	1.45	1.80	0.053
H001	AS65	AS 365 N1 DAUPHIN	ARRIEL 1C1	1	274	1.87	1.41	1.74	0.056
H001	AS65	AS 365 N3 DAUPHIN	ARRIEL 2C	1	309	2.34	1.31	1.60	0.068
H001	B06	BELL 206B	DDA250-C20	1	109	0.61	0.82	1.03	0.019
H001	B06	BELL 206B	DDA250-C20B	0.9	101	0.58	0.72	0.90	0.018
H001	B06	BELL 206B	DDA250-C20J	0.9	101	0.58	0.72	0.90	0.018
H001	B06	BELL 206B	DDA250-C20R	0.9	105	0.63	0.70	0.86	0.019
H001	B06	BELL 206B	DDA250-C20R/4	0.9	105	0.63	0.70	0.86	0.019
H001	B06	BELL 206L	DDA250-C20R	1	117	0.70	0.77	0.96	0.022
H001	B06	BELL 206L	DDA250-C30	1	149	1.10	0.66	0.82	0.032
H001	B06	BELL 206L	DDA250-C30P	1	149	1.10	0.66	0.82	0.032
H001	B06T	Bell TWIN RANGER	DDA250-C20R	1	210	1.11	1.74	2.17	0.036
H001	B105	BO 105	DDA250-C20	1	200	0.99	1.88	2.36	0.033
H001	B105	BO 105	DDA250-C20B	1	204	1.04	1.82	2.28	0.034
H001	B222	BELL 222	DDA250-C40B	1	278	1.92	1.40	1.72	0.057
H001	B222	BELL 222	LTS101-750C.1	1	283	1.98	1.38	1.70	0.059
H001	B407	Bell 407	DDA250-C47B	1	149	1.10	0.66	0.82	0.032
H014	B412	Bell 412	PT6T-3	1	541	6.14	1.06	1.27	0.168
H001	B430	Bell 430	DDA250-C40B	1	278	1.92	1.40	1.72	0.057
H001	BK17	BK117	ARRIEL 1E2	1	283	1.99	1.38	1.70	0.059
H001	BK17	BK117 C-2	ARRIEL 1E2	1	283	1.99	1.38	1.70	0.059
H001	BK17	BK117B	LTS101-750B.1	1	281	1.96	1.39	1.71	0.058
H001	EC20	EC 120	ARRIUS 2F	1	114	0.67	0.79	0.98	0.021
H001	EC30	EC 130 B4	ARRIEL 2B1	1	183	1.56	0.61	0.74	0.045
H001	EC35	EC 135	ARRIUS 2B1	1	259	1.67	1.49	1.84	0.051
H001	EC35	EC 135	ARRIUS 2B2	1	259	1.67	1.49	1.84	0.051
H001	EC55	EC 155 B	ARRIEL 2C1	1	309	2.34	1.31	1.60	0.068
H001	EC55	EC 155 B1	ARRIEL 2C2	1	337	2.73	1.26	1.54	0.079
H001	EN48	ENSTROM 480	DDA250-C20W	1	112	0.64	0.80	1.00	0.020
H019	EXPL	MD 900	PW206A	1	257	1.64	1.50	1.86	0.050
H001	GAZL	SA341 GAZELLE	ASTAZOU IIIA	1	148	1.09	0.67	0.82	0.032
H001	GAZL	SA341 GAZELLE	ASTAZOU IIIN2	1	148	1.09	0.67	0.82	0.032
H001	GAZL	SA342 GAZELLE	ASTAZOU XIVG	1	139	0.97	0.69	0.85	0.029
H001	GAZL	SA342 GAZELLE	ASTAZOU XIVH	1	139	0.97	0.69	0.85	0.029
H001	H500	HUGHES 500	DDA250-C18	1	99	0.48	0.96	1.20	0.016
H001	H500	HUGHES 501	DDA250-C20B	1	112	0.64	0.80	1.00	0.020
H001	H500	MD 500N	DDA250-C20R	1	117	0.70	0.77	0.96	0.022
H002	H53	SIKORSKY CH-53G (S-65)	T 64-GE-7	1	977	17.27	0.82	0.96	0.388
H002	H53S	SIKORSKY SUPER STALLION	T 64-GE-7	1	1332	21.99	1.27	1.50	0.523
H002	H60	SIKORSKY BLACK HAWK	T700-GE-700	1	508	5.43	1.11	1.34	0.150
H001	KA27	KA-32A12	TV3-117VMA	1	621	7.90	0.98	1.17	0.211
H001	KMAX	K-1200	T53 17A-1	1	284	3.36	0.51	0.61	0.091
H001	LAMA	SA315B LAMA	ARTOUSTE IIIB	1.18	159	1.08	0.83	1.02	0.032
H001	MD52	MD 520N	DDA250-C20	1	109	0.61	0.82	1.03	0.019
H001	MD60	MD 600N	DDA250-C47M	1	149	1.10	0.66	0.82	0.032
H002	MI8	MIL MI-8	TV2-117	1	485	4.97	1.15	1.39	0.138
H001	S76	SIKORSKY S76	DDA250-C30S	1	263	1.72	1.46	1.81	0.052
H011	S76	SIKORSKY S76	PT6B-36A	1	348	2.87	1.24	1.52	0.082
H001	S76	SIKORSKY S-76 C+	ARRIEL 2S1	1	313	2.40	1.30	1.59	0.070
H002	S92	SIKORSKY S92A	GE CT7-8A	1	735	10.59	0.91	1.08	0.271
H002	UH1	BELL UH-1H	T53 L13	1	271	3.09	0.53	0.63	0.084
HP..	UH12	HILLER UH-12A	VO-540-1B	1	82	0.16	0.91	82.33	0.006
HP..	B47G	Bell 47G	LYC TVO-435-B1A	1	65	0.13	0.76	64.62	0.005
HP..	B47G	Bell 47G-3B	LYC VO-435-A1D	1	50	0.10	0.63	49.94	0.003
HP42	EN28	ENSTROM 280C	HIO-360	1	42	0.08	0.56	42.00	0.003
H001	EXEC	ROTORWAY EXEC 90	ROTORWAY RI-162	1	32	0.06	0.46	32.07	0.002
HP42	H269	SCHWEIZER 269C	HIO-360	1	42	0.08	0.56	42.00	0.003
HP42	HU30	HUGHES 300	HIO-360	1	42	0.08	0.56	42.00	0.003
HP41	R22	R22 BETA	HO-360	1	39	0.08	0.53	39.46	0.003
HP44	R44	R44 RAVEN	HIO-540	1	57	0.11	0.69	57.00	0.004
HP..	SCOR	ROTORWAY SCORPION	ROTORWAY RW 133	1	28	0.06	0.42	28.04	0.002
HP..	SYCA	BRISTOL SYCAMORE	ALVIS LEONIDES	1	277	0.55	2.52	276.80	0.019

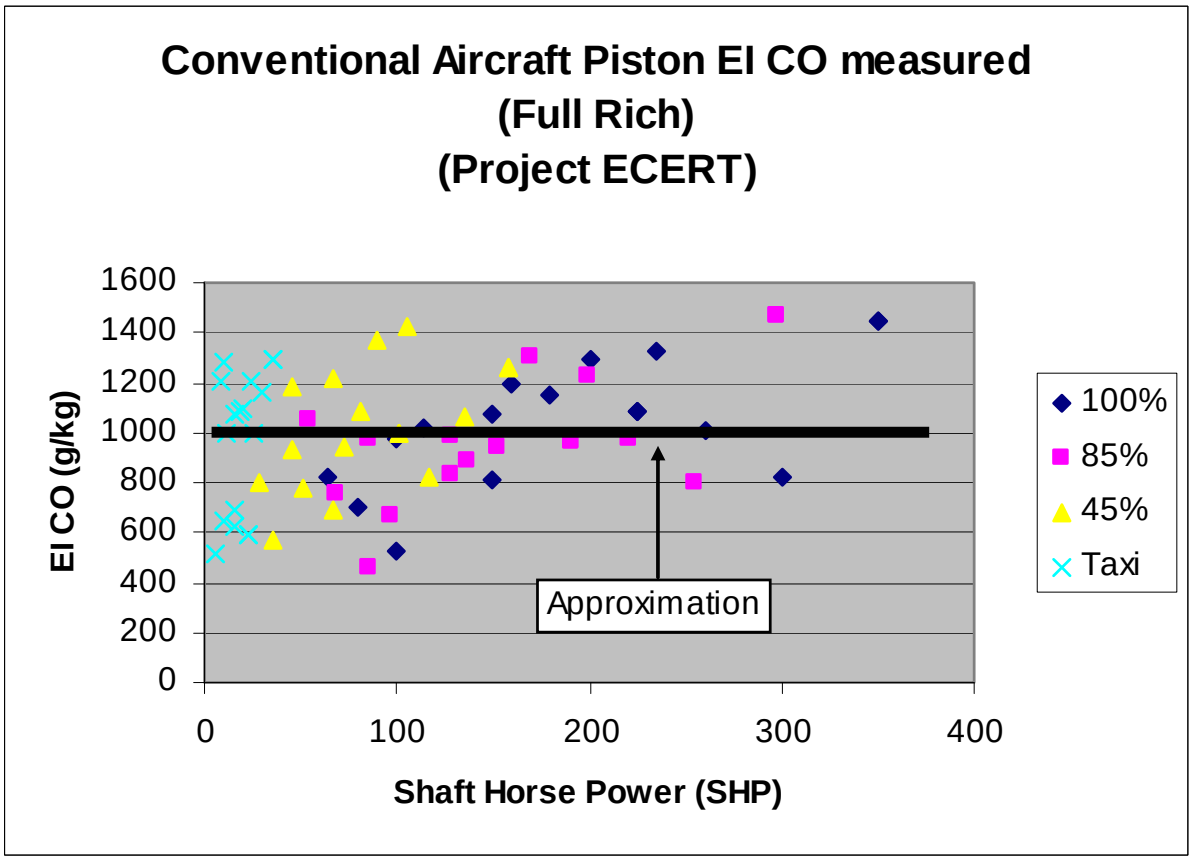
Appendix E: Graphical Representation of Approximation Functions for Piston Engines



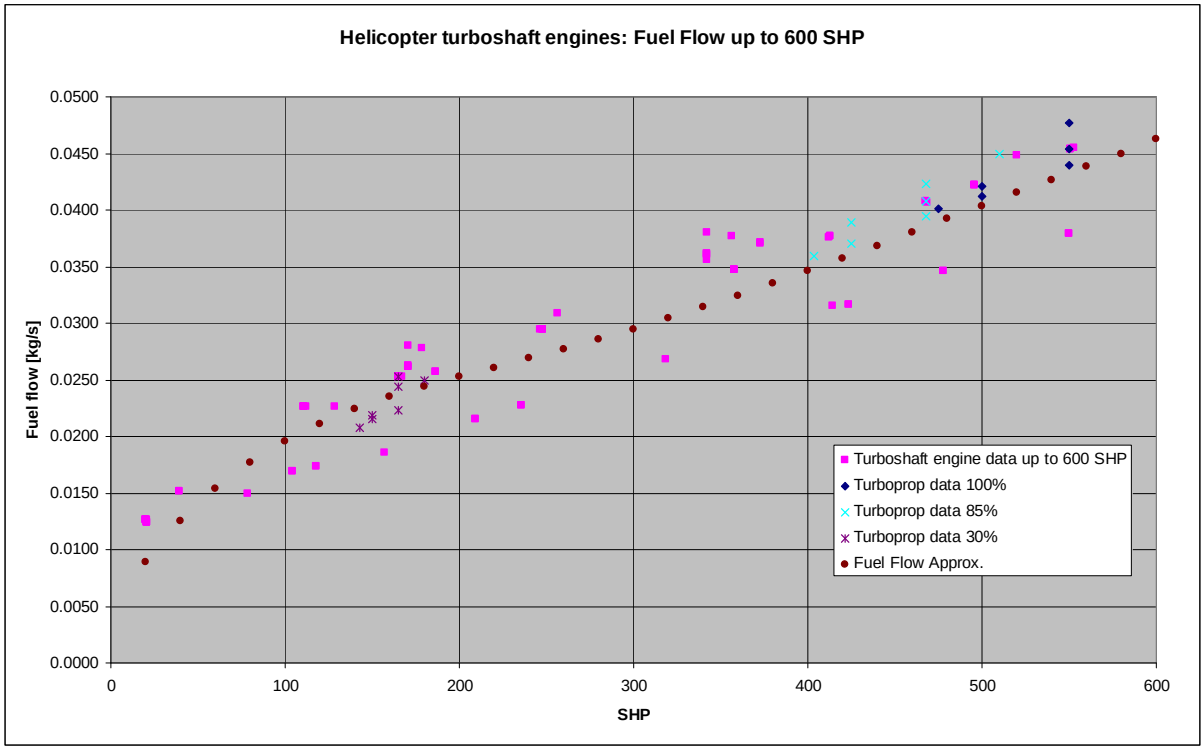


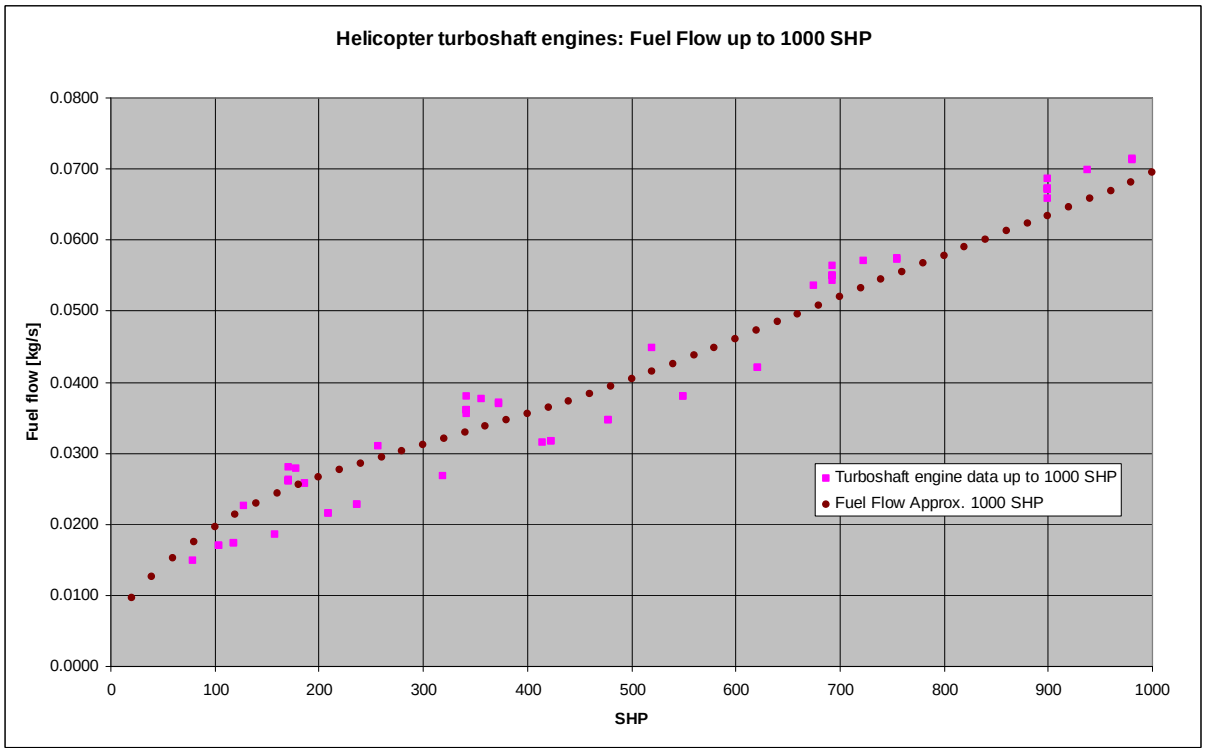


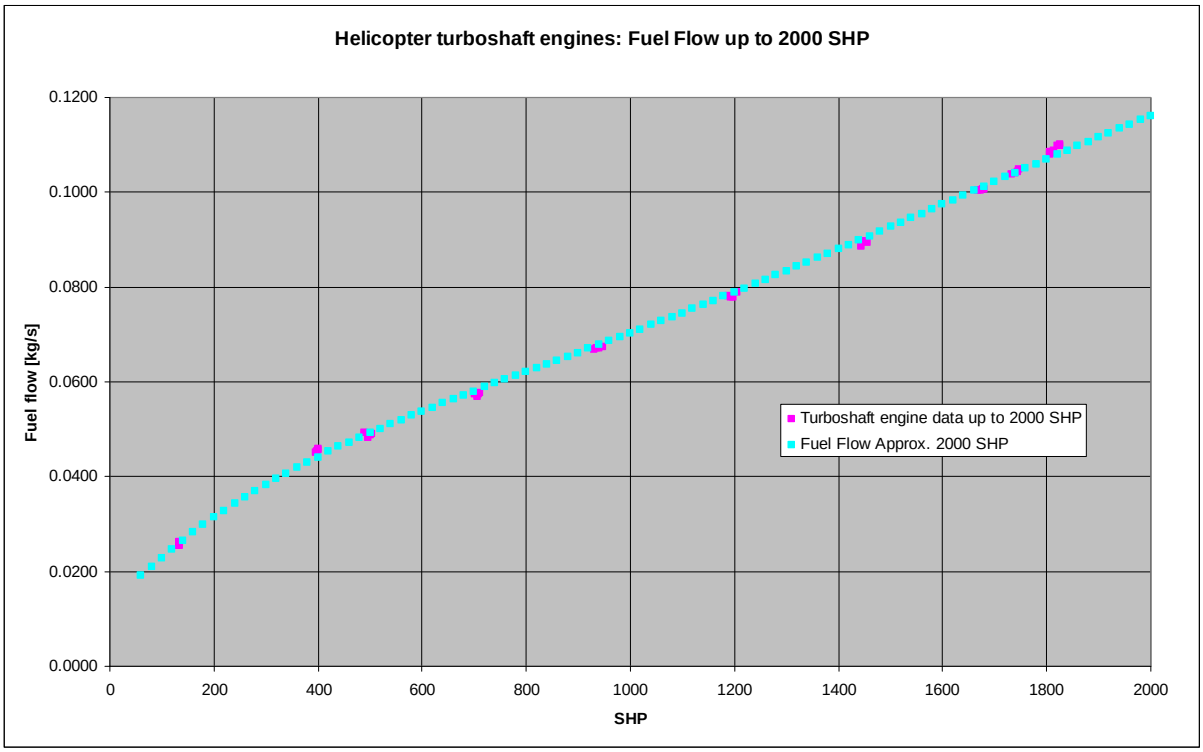

Conventional Aircraft Piston EI HC (Full Rich)
(Project ECERT)
EI HC (g/kg)
60
50
40
30
20
10
0
0
100
200
300
400
Shaft Horse Power (SHP)
EI HC [g/kg] ≈ 80 * SHP^-0.35
HC measured
HC estimated

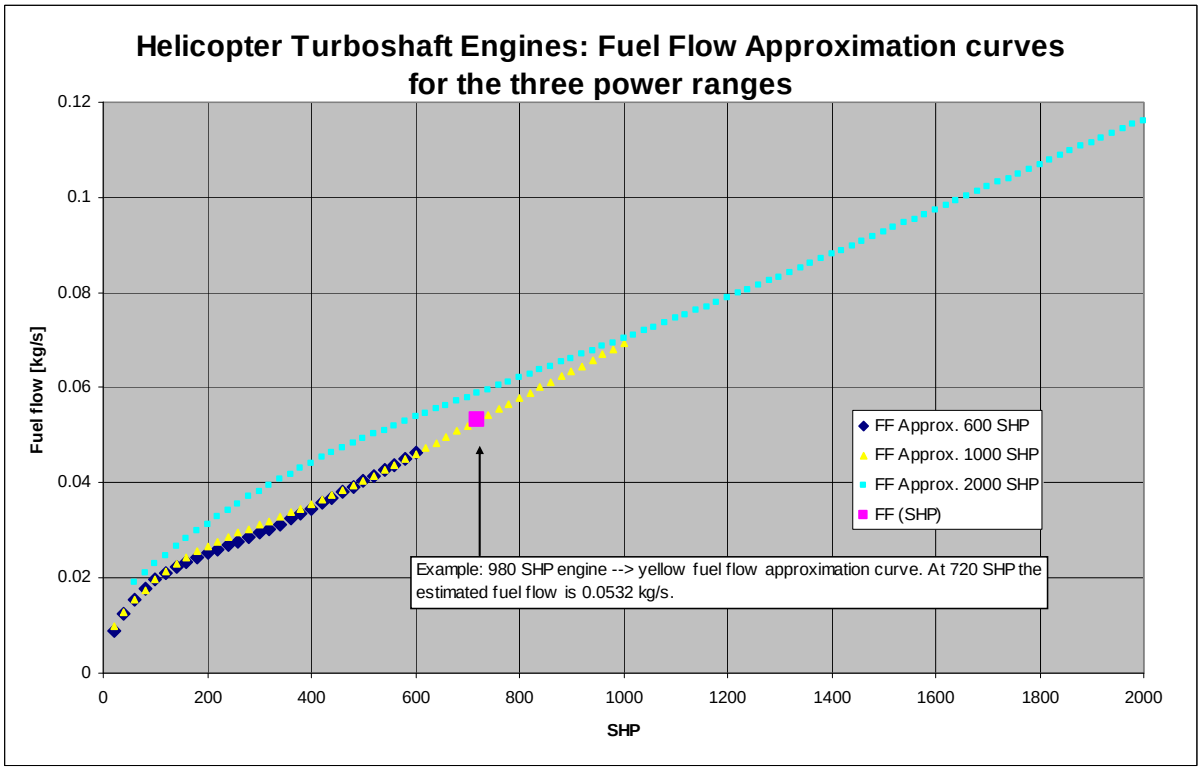

Conventional Aircraft Piston EI CO measured
(Full Rich)
(Project ECERT)
EI CO (g/kg)
1600
1400
1200
1000
800
600
400
200
0
0
100
200
300
400
Shaft Horse Power (SHP)
Approximation
100%
85%
45%
Taxi

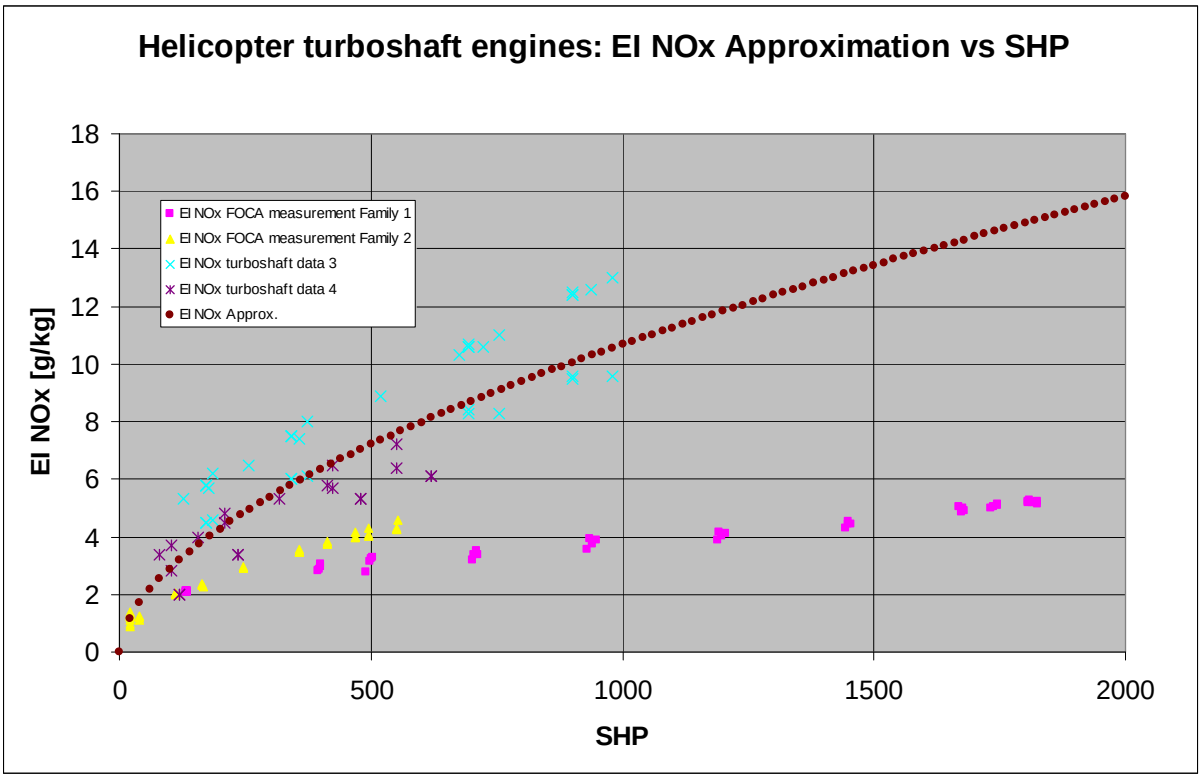
Appendix F: Graphical Representation of Approximation Functions for Turboshaft Engines

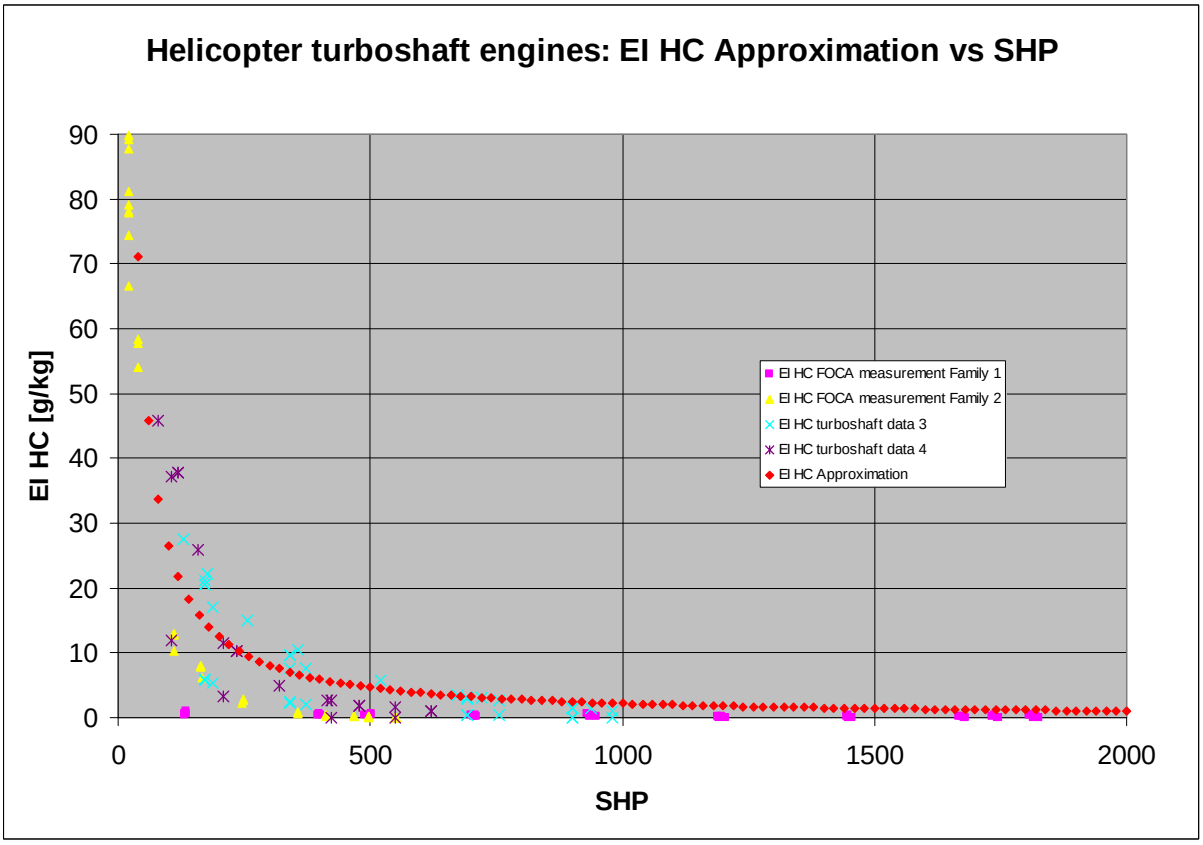


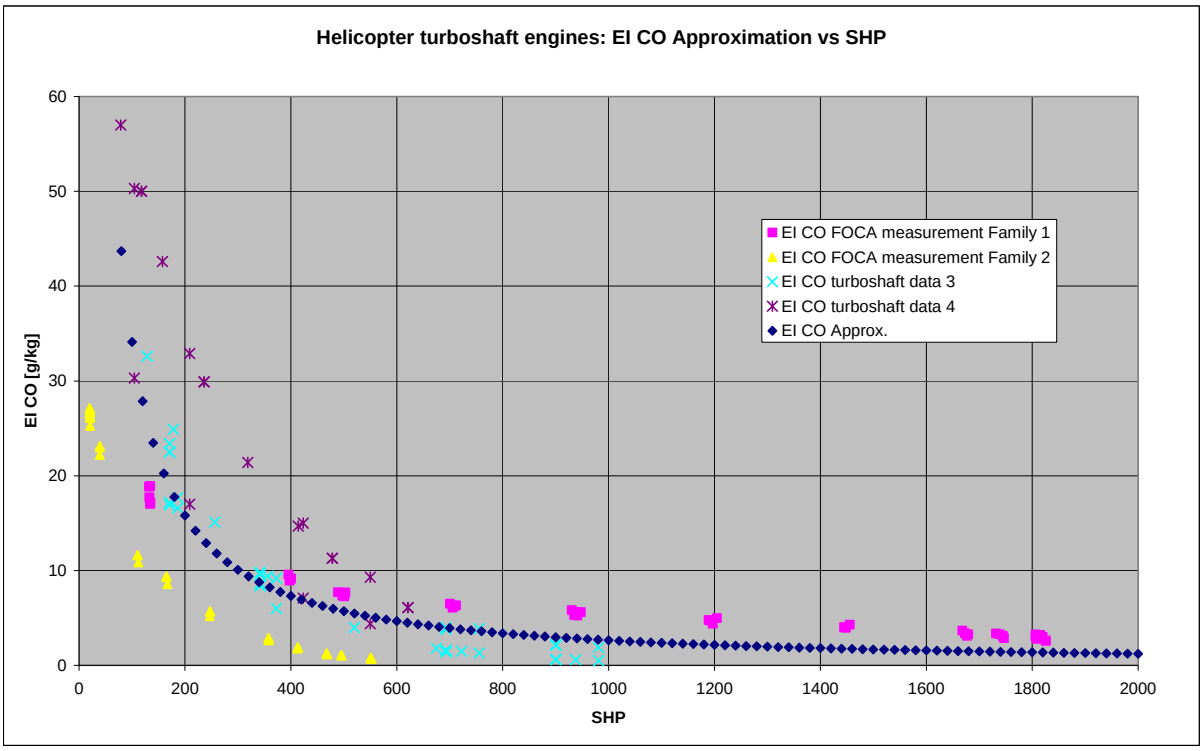


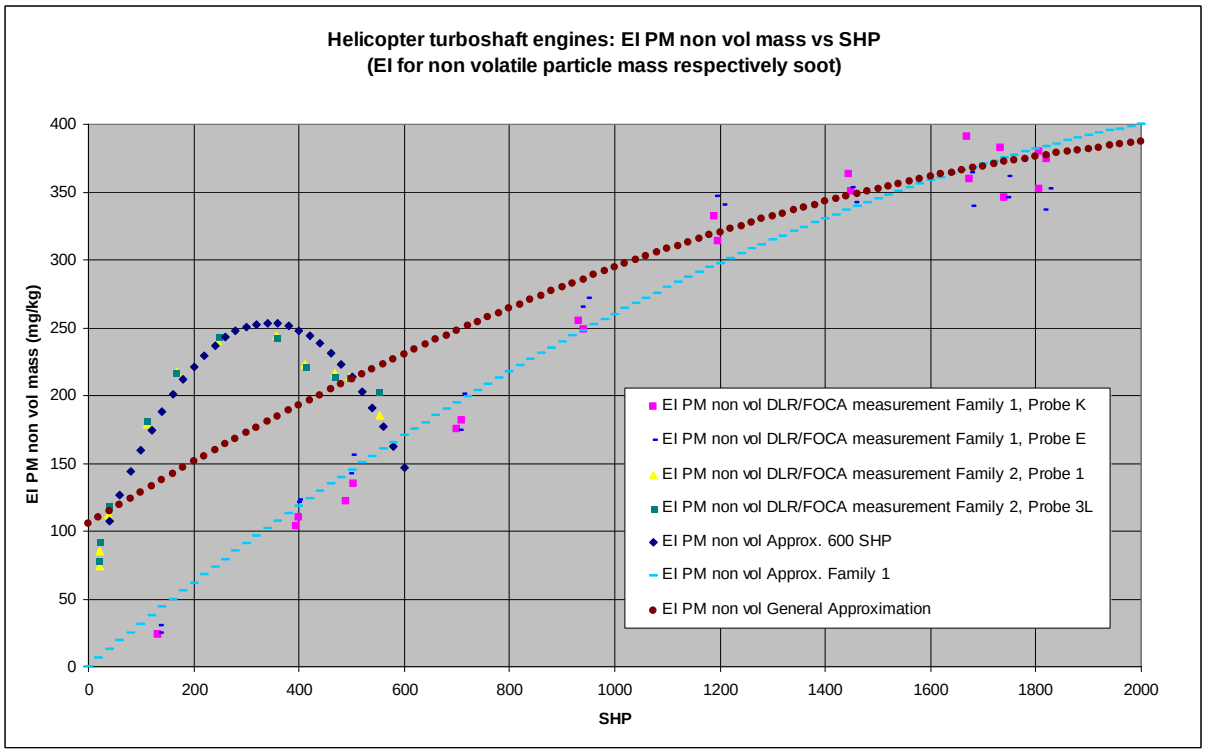

Helicopter turboshaft engines: Fuel Flow up to 2000 SHP
Fuel flow [kg/s]
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
0
200
400
600
800
1000
1200
1400
1600
1800
2000
SHP
Turboshaft engine data up to 2000 SHP
Fuel Flow Approx. 2000 SHP

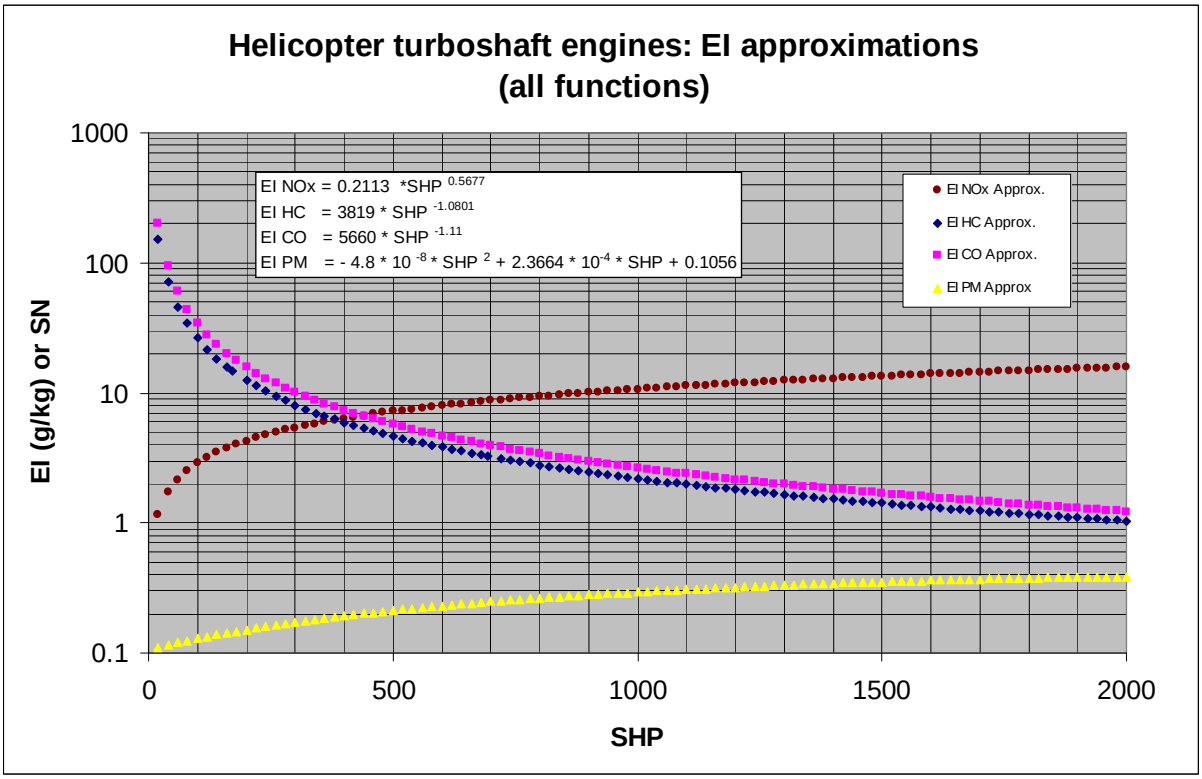

Helicopter Turboshaft Engines: Fuel Flow Approximation curves for the three power ranges
Fuel flow [kg/s]
0.12
0.1
0.08
0.06
0.04
0.02
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
SHP
FF Approx. 600 SHP
FF Approx. 1000 SHP
FF Approx. 2000 SHP
FF (SHP)
Example: 980 SHP engine --> yellow fuel flow approximation curve. At 720 SHP the estimated fuel flow is 0.0532 kg/s.


Helicopter turboshaft engines: EI NOx Approximation vs SHP
EI NOx [g/kg]
SHP
0
2
4
6
8
10
12
14
16
18
0
500
1000
1500
2000
EI NOx FOCA measurement Family 1
EI NOx FOCA measurement Family 2
EI NOx turboshaft data 3
EI NOx turboshaft data 4
EI NOx Approx.


Helicopter turboshaft engines: EI HC Approximation vs SHP
EI HC [g/kg]
SHP
0
10
20
30
40
50
60
70
80
90
0
500
1000
1500
2000
EI HC FOCA measurement Family 1
EI HC FOCA measurement Family 2
EI HC turboshaft data 3
EI HC turboshaft data 4
EI HC Approximation


Helicopter turboshaft engines: EI CO Approximation vs SHP
EI CO [g/kg]
SHP
0
10
20
30
40
50
60
0
200
400
600
800
1000
1200
1400
1600
1800
2000
EI CO FOCA measurement Family 1
EI CO FOCA measurement Family 2
EI CO turboshaft data 3
EI CO turboshaft data 4
EI CO Approx.


Helicopter turboshaft engines: EI PM non vol mass vs SHP
(EI for non volatile particle mass respectively soot)
EI PM non vol mass (mg/kg)
SHP
0
50
100
150
200
250
300
350
400
0
200
400
600
800
1000
1200
1400
1600
1800
2000
EI PM non vol DLR/FOCA measurement Family 1, Probe K
EI PM non vol DLR/FOCA measurement Family 1, Probe E
EI PM non vol DLR/FOCA measurement Family 2, Probe 1
EI PM non vol DLR/FOCA measurement Family 2, Probe 3L
EI PM non vol Approx. 600 SHP
EI PM non vol Approx. Family 1
EI PM non vol General Approximation


Helicopter turboshaft engines: EI approximations
(all functions)
EI NOx = 0.2113 *SHP 0.5677
EI HC = 3819 * SHP -1.0801
EI CO = 5660 * SHP -1.11
EI PM = - 4.8 * 10 -8 * SHP 2 + 2.3664 * 10-4 * SHP + 0.1056
EI NOx Approx.
EI HC Approx.
EI CO Approx.
EI PM Approx
EI (g/kg) or SN
1000
100
10
1
0.1
0
500
1000
1500
2000
SHP

From: Mike Etchemendy
Sent: Friday, September 07, 2012 11:13 AM
To: Dawn Felchle
Subject: Teton Springs Heli-skiing

Commissioners,

I am a year round resident of Teton Springs in favor of the Heli - Skiing operation.

I am in favor of creating or keeping jobs in Teton County. If this operation is lost to the county, it will go elsewhere in an adjacent county and the revenues and jobs created will go with it.

Frankly, I love the sound of the helicopter and though I have not ever been able to even detect the smell of the Jet A, I would welcome that as well, because it means that people are spending money in this valley and that money is keeping people employed and businesses doors open.

I travel across the country for work and see what this economy is doing to small towns, large towns, cities, families, generations and individuals.

Now is not the time to turn away businesses trying to make this county their base.

Thank you

From: Christian Cisco
Sent: Monday, September 10, 2012 7:15 PM
To: Curt Moore
Cc: Jon Shick
Subject: Teton Springs - High Mountain Heli Skiing

Hello Curt - I am writing in favor and support of Jon Shick and HMH and their operation in Teton Springs. I live within 200 yards of the current helipad year round and work from home many days throughout the winter. HMH is a good operator, an employer and a steward to the community. As a homeowner in Teton Springs I view them as an asset to Teton Springs and the Teton Valley community as a whole.

I have to respectfully disagree with a few of the comments I have read in regards to the "fume" complaints. I have never noticed any fumes whatsoever even while standing on my South East facing deck during take off and landings. The minimal noise disturbance during take off and landing is also something that I have a hard time even noticing if I am in the house, versus standing outside looking for the ship.

HMH is a good business for both Teton Springs and the Teton Valley. This business provides jobs, creates positive energy and a buzz for Teton Springs. Jon's operation is also an added value to our community from a search and rescue resource perspective, which I have not heard anyone reference but feel this is a major point to consider in the approval of this application. We are all outdoor enthusiast in one capacity or another and the contribution(s) available to our community by HMH can serve us all in a positive manner.

Respectfully,

Christian Cisco
Teton Springs