APPENDIX D

ASSUMPTIONS AND CALCULATIONS USED FOR GENERAL CONFORMITY RULE DETERMINATION

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RECURRING EMISSIONS

To address the concerns identified in public comments received on the methodology used to calculate potential air emissions for particulate matter up to 10 micrometers (diameter) in size (PM₁₀), carbon monoxide (CO), and ozone from the operation of watercraft, Reclamation consulted with staff from the Maricopa County Air Quality Division (MCAQD). MCAQD staff described the methodology and models used to calculate estimated emissions that are included in emission inventory reports. In its 2002 emissions inventory of nonroad mobile sources, MCAQD indicated emission calculations for pleasure craft (watercraft) nonroad mobile sources were derived from running U.S. Environmental Protection Agency's (EPA) NONROAD2002 model. This model has since been superceded by the NONROAD2005 model.

EPA's technical report, "Geographic Allocation of Nonroad Engine Population Data to the State and County Level" describes the methodology and source of data used in its NONROAD model, which allocates nonroad mobile equipment populations from the national to state and county levels (EPA 2005). According to that report, the NONROAD model is designed to use various types of economic and industry-related information regarding equipment population or activity. The model apportions national equipment populations and their associated activity to state and county levels. For pleasure craft, the model uses nationally gathered statistics on boat/motor sales and gasoline consumption distribution estimates, as well as county-level water surface area data from the U.S. Census Bureau. EPA has adjusted the model in an attempt to account for limitations associated with using water surface area alone to establish both national and state level pleasure craft numbers. The model was also adjusted to address its inability to accurately predict where pleasure craft are actually operated. Also in this report, EPA encourages State, regional and local air agencies to utilize local survey data as a more accurate means to assess boat populations and activity at the county level when using the NONROAD model (EPA 2005).

In our discussions, MCAQD staff reiterated EPA's recommendation that default NONROAD model values be adjusted where local data are available, and stressed that local data are preferred if they are available. Based upon this guidance, Reclamation chose to replace the methodology used for calculating potential watercraft-related emissions from the proposed project described in the July 2006 draft and October 2006 revised draft EAs, with use of the EPA NONROAD2005 model. Local survey data were substituted for the default values found in the national model.

Reclamation's premise for collecting local survey data was based upon the assumption that the watercraft motor numbers, types and sizes at the proposed marina would approximate the same percentages of those found at Pleasant Harbor Marina. Reclamation attempted to inventory the boat motor sizes/types found at the existing Pleasant Harbor Marina to establish the ratio of the various sizes and types of motors to the total number of watercraft stored at the existing marina. Unfortunately, Reclamation was unable to obtain timely entrance to the marina to conduct this inventory.

As an alternative, Reclamation staff familiar with watercraft and Pleasant Harbor Marina reviewed and modified estimates provided by the proposed marina concessionaire. These estimates were based upon a partial inventory that was conducted by staff from the proposed marina concession on January 19 and 29, 2007, of the wet slips, dry stack storage building, and outdoor storage area at Pleasant Harbor Marina. Although a 100 percent inventory was not completed during those visits, the higher polluting motors were identified (2- and 4-stroke outboard motors), as well as the higher horsepower motors (300- to 600-horsepower inboard, and over 600-horsepower inboard motors). The person conducting the inventory was very familiar with Pleasant Harbor Marina and also estimated there were 110 sailboats moored at the marina. These were assumed to have diesel motors in the 1- to 25-horsepower range. Assuming the existing marina is completely rented out, the remaining slips and storage spaces that were not accounted for in the onsite inventory were distributed evenly between 100- to 175-horsepower motors and 175- to 300-horsepower motors.

The percentages of the various motor types and sizes to the total capacity at the existing marina were determined. These same percentages were then used to estimate the number of each type and size of motor that would be expected to be stored at the proposed marina, assuming the proposed marina is completely built and rented out. Reclamation redistributed the distribution of 100- to 175-horsepower and 175- to 300-horsepower motors to favor the higher-powered motors, based upon staff familiarity with recreational boating.

Some additional adjustments were also made. The inventory provided by the proposed marina concessionaire did not identify any personal watercraft at the existing marina; however, Reclamation staff indicated typically houseboats may also have a personal watercraft tied up alongside. We estimated the number of houseboats at Pleasant Harbor Marina utilizing aerial photography (Google Earth 2007). Reclamation staff estimated there were 70 houseboats moored at the existing marina and added one personal watercraft per houseboat to the proposed marina's inventory, or the equivalent of 11 percent of the wet slips. The 36 watercraft associated with the new public boat ramp were all assumed to have the higher emission motors (2-stroke outboard motors), and were also added to the proposed marina's inventory.

Once the watercraft motors anticipated to be associated with the proposed marina were identified by type and size, they needed to be further broken down by engine types included in the NONROAD model. These did not, in every case, reflect the motors actually found at the existing marina; therefore, additional professional judgments were made in distributing these motors into the most appropriate categories available in the NONROAD2005 model. The assumptions of the boat mix and breakdown by NONROAD motor classification follow this narrative.

These estimates of the numbers, types and sizes of boat motors as delineated in the NONROAD model were then provided to MCAQD. Where appropriate, adjustment was also made to the activity level in the model. MCAQD then ran the NONROAD2005 model using the

local survey data in place of the default values. The results of MCAQD's model run are provided in this appendix. Upon receipt of the model's output from MCAQD, we revised the final EA accordingly.¹

CONSTRUCTION EMISSIONS

Some questions were raised regarding the calculations for construction-related emissions. The emission calculation sheets at the end of this appendix have been revised to clearly identify the source of the emission factors used.

LITERATURE CITED

Environmental Protection Agency. (2005). Geographic allocation of nonroad engine population data to the state and county level, NR-014d (EPA420-R-05-021). Retrieved February 8, 2007, from <u>http://www.epa.gov/otaq/models/nonrdmdl/nonrdmdl2005/420r05021.pdf</u>.

Google Earth. (2007). Area over Lake Pleasant. Retrieved from Google Earth (Pointer: 35°51'01.64° N 112°15'35.16° W, elevation 1,551 feet) on February 14, 2007.

¹ Subsequent to MCAQD running the model with the numbers provided by Reclamation, we discovered an error had been made in allocating personal watercraft associated with houseboats anticipated to be moored at the proposed marina. Seventy personal watercraft were added to the inventory; however, this number should have been 88 personal watercraft, or 11 percent of the 800 wet slips at the proposed marina. Instead of re-running the model with the corrected values, MCAQD suggested we merely use the data provided by MCAQD to recalculate the emissions for these additional 18 personal watercraft. We also discovered an error had been made in determining the percentage of the area of Lake Pleasant that falls within the PM₁₀ nonattainment area. The correct percentage should be 51 percent, rather than the 46 percent that is shown in MCAQD's letter dated February 16, 2007. These adjustments were made to the data provided in MCAQD's letter. They are reflected in the final EA, and in this appendix following MCAQD's letter dated February 16, 2007.

ESTIMATES PROVIDED BY THE PROPOSED MARINA CONCESSIONAIRE

Scorpion Bay Marina & Yacht Club Boat Emission Assumptions and Calculations February 12, 2007 Michael C. Vaile, P.E.

On 1-19-07 Cris McSparen, former Pleasant Harbor Marina Manager and current Skipper Marine Development employee, counted the number of boats with 2 stroke and 4 stroke outboard engines.

Wet Slips, of 640 total slips, 53 had 2 stroke engines, 43 had 4 stroke engines. Dry Stack, of 180 total spots, 5 had 2 stroke engines, 3 had 4 stroke engines. Outdoor Storage, of 300 spaces, 16 had 2 stroke engines, 12 had 4 stroke engines

I had Cris count the boats w. outboard engines only since Table 4.0-1 annual emissions from pleasure craft showed that the 2 stroke engines produced the majority of the CO emissions. I wanted to try to show that with the new regulations in place there would be very few 2 stroke engines in the new marina. Since the amount of 2 stroke engines would be a key variable when calculating emissions using the Nonroad model, I wanted to make sure we were using at least what was present at Pleasant Harbor.

I divided the number of 2 stroke outboards between the 75-100 hp and the 100-175 hp range because I assumed that the boats that would use a marina would be the larger boats, while smaller boats (1-75 hp) would come to the lake on trailers and use the public ramps. I did not use the 175-300 hp range because Lake Pleasant is a small lake with no "destination points".

On 1-29-07, Cris McSparen counted the number of boats that had 300 hp to 600 hp inboard engines and the number of boats that had greater than 600 hp inboard engines.

Wet Slips, of 640 total slips, 126 had engines larger than 300 hp, of which 60 were greater than 600 hp. Dry Stack, of 180 total spots, 15 had engines larger than 300 hp, of which 0 were greater than 600 hp. Outdoor Storage, of 300 spaces, 31 had engines larger than 300 hp, of which 2 were greater than 600 hp.

The large hp engines are another key variable for correctly calculating the emissions. After learning how the Nonroad model works, that to calculate emissions you multiply each boats emission factor by the hp-hour, I felt we needed to know how many of the boats with the bigger engines there were. I did not include any boats w. engines below 75 hp for the same reason as above. The 4 stroke outboards were divided between the 75-100 hp and the 100-175 hp range. I did not include any diesel engines since we will not sell diesel fuel at our facility. There is diesel available at Pleasant Harbor Marina.

Cris McSparen, from experience as marina manager, recalled there were 110 sailboats in the marina. This information would be critical to the operation of the marina. The mast and keel of the sailboat require special attention, so this would be information Cris would remember.

I did not include any PWCs (Personal Water Craft) since we will not rent them or have a dedicated area for storage. There will be a few that will be stored in the slips with a boat. The 36 Public Launch parking spaces are assumed to be 2 stroke outboards. This would be the worst case scenario and should make up for the fact we have not included PWCs in the mix. For the remaining 308 boats in the wet slips, I assumed that half have inboard engines less than 175 hp and half have inboard engines larger than 175 hp. For the remaining 398 boats in the dry slips, I assumed that half have inboard engines less than 175 hp.

@ Pleasant Harbor Marina

640 Wet Slips 110 are sailboats 17.2% from C. McSparen 9.4% from C. McSparen count on 1-29-07 60 are over 600 hp 66 are 300-600 hp 10.3% from C. McSparen count on 1-29-07 154 are 175-300 hp 24.1% est. M. Vaile 154 are 100-175 hp 24.1% est. M. Vaile 43 are 4 stroke outboards 6.7% from C. McSparen count on 1-19-07 53 are 2 stroke outboards 8.3% from C. McSparen count on 1-19-07 640 100.0% 480 Dry Slips 2 are over 600 hp 0.4% from C. McSparen count on 1-29-07 44 are 300-600 hp 9.2% from C. McSparen count on 1-29-07 199 are 175-300 hp 41.5% est. M. Vaile 199 are 100-175 hp 41.5% est. M. Vaile 15 are 4 stroke outboards 3.1% from C. McSparen count on 1-19-07 21 are 2 stroke outboards 4.4% from C. McSparen count on 1-19-07 480 100.0%

For Scorpion Bay Marina (assumption of what boat mix is anticipated to be at build out in 2015)

800 Wet Slips

17.2% are sailboats	138
9.4% are over 600 hp	75
10.3% are 300-600 hp	83
24.1% are 175-300 hp	193
24.1% are 100-175 hp	193
6.7% are 4 stroke outboards	54
8.3% are 2 stroke outboards	66
100.0%	800

200 Dry Slips

0.4% are over 600 hp	1
9.2% are 300-600 hp	18
41.5% are 175-300 hp	83
41.5% are 100-175 hp	83
3.1% are 4 stroke outboards	6
4.4% are 2 stroke outboards	9
100.0%	200

36 Public Launch are 2 stroke outboards

1036 Total @ Scorpion Bay Marina

138 are sailboats 76 are over 600 hp 101 are 300-600 hp 275 are 175-300 hp 275 are 100-175 hp 60 are 4 stroke outboards 111 are 2 stroke outboards 1036

When we run the model it should be for the year 2015. The model will take into account assumed emission factors based on the current EPA requirements. The year 2015 was selected as the anticipated end of construction when the maximum number of boats will occur (1036 boats).

For the number of hours for sailboats I assumed 20 minutes to/from the dock using the engine and 26 uses per year = 9 hrs/year. I based these assumptions from a conversation with Chuck Hutchins, Sales Associate with SkipperBud's, (parent company of SMD). Per Chuck all sailboats under 30' in length sold today have a 15-18 hp diesel engine. After I explained the new marina at Lake Pleasant he agreed with the 20 minutes to/from the dock as conservative. Since there is no "destination point" to go to from Lake Pleasant, the engines would only be used inside the marina. Other areas of the country require a long travel time from marina to open water, i.e. the intercoastal waterway, transporting a sail boat to/from winter storage, ect. that would account for the 67 hours/year the model uses.

LOGIC FOR PROPOSED MARINA MOTOR INVENTORY FROM SKIPPER MARINE (AS REVISED BY RECLAMATION)

For Scorpion Bay Marina (assumption of what boat mix is anticipated to be at build out in 2015)

800 Wet Slips

17.2% are sailboats	137.50
9.4% are over 600 hp	75.00
10.3% are 300-600 hp	82.50
31.7% are 175-300 hp	253.97
16.4% are 100-175 hp	130.83
6.7% are 4 stroke outboards	53.75
8.3% are 2 stroke outboards	66.25
100.0%	799.80

200 Dry Slips

0.4% are over 600 hp	0.83
9.2% are 300-600 hp	18.33
54.7% are 175-300 hp	109.43
28.2% are 100-175 hp	56.37
3.1% are 4 stroke outboards	6.25
4.4% are 2 stroke outboards	8.75
100.0%	199.97

36 Public Launch are 2 stroke outboards

1036 Total @ Scorpion Bay Marina

These are in the Diesel 1-25 hp range
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Note 1
Note 2
Note 3

1106 Total @ Scorpion Bay Marina as revised

Note 1: 1 put 30 in the 75-100 hp inboard range and 30 in the 100-175 hp inboard range

Note 2: I put 65 boats in the 100-175 hp outboard range and 46 in the 75-100 hp outboard range

Note 3: I put 56 in the 4-str 100-175 hp inboard range and 14 in the 2-str 100-175 hp outboard range

SCC code	Engine type	General Description	HP Min	HP Max	Est. Annual Lake Pleasant Population	Activity (Hrs/yr)	Est. Annual Lake Pleasant Activity (Hrs/yr)
2282005010	2-Str	Outboard	1	3		34.8	
2282005010	2-Str	Outboard	3	6		34.8	
2282005010	2-Str	Outboard	6	11		34.8	
2282005010	2-Str	Outboard	11	16		34.8	
2282005010	2-Str	Outboard	16	25		34.8	
2282005010	2-Str	Outboard	25	40		34.8	
2282005010	2-Str	Outboard	40	50		34.8	
2282005010	2-Str	Outboard	50	75		34.8	
2282005010	2-Str	Outboard	75	100	46	34.8	
2282005010	2-Str	Outboard	100	175	65	34.8	
2282005010	2-Str	Outboard	175	300		34.8	
2282005015	2-Str	Personal Water Craft	1	3		77.3	
2282005015	2-Str	Personal Water Craft	3	6		77.3	
2282005015	2-Str	Personal Water Craft	6	11		77.3	
2282005015	2-Str	Personal Water Craft	16	25	-	77.3	
2282005015	2-Str	Personal Water Craft	25	40		77.3	
2282005015	2-Str	Personal Water Craft	40	50		77.3	
2282005015	2-Str	Personal Water Craft	50	75		77.3	
2282005015	2-Str	Personal Water Craft	75	100		77.3	
2282005015	2-Str	Personal Water Craft	100	175	14	77.3	
2282005015	2-Str	Personal Water Craft	175	300		77.3	
2282010005	4-Str	Inboard/Sterndrive	3	6		47.6	
2282010005	4-Str	Inboard/Sterndrive	6	11		47.6	
2282010005	4-Str	Inboard/Sterndrive	11	16		47.6	
2282010005	4-Str	Inboard/Sterndrive	25	40		47.6	
2282010005	4-Str	Inboard/Sterndrive	50	75		47.6	
2282010005	4-Str	Inboard/Sterndrive	75	100	30	47.6	
2282010005	4-Str	Inboard/Sterndrive	100	175	273	47.6	······
2282010005	4-Str	Inboard/Sterndrive	175	300	363	47.6	
2282010005	4-Str	Inboard/Sterndrive	300	600	101	47.6	
2282010005	4-Str	Inboard/Sterndrive	600	750	76	47.6	
	Diesel		1	25	138	10	Sailboat
					1106		



Maricopa County

Emissions Inventory Unit 1001 N. Central Ave., Ste. 595 Phoenix, Arizona 85004 Phone: (602) 506-6790 Fax: (602) 506-6179 Air Quality Department

February 16, 2007

Bureau of Reclamation

6150 W. Thunderbird Road

Glendale, AZ 85306-4001

Phoenix Area Office

Ms. Sandra Eto

OFFICIAL ACTION BY FHE CUPY-APO DUE DATE FEB 2 2 1.7 DATE ROUTE TO IMILIALS CLASSIFICATION CONTROL NO. FOLDER I.D. UPDATE

KEYWORD

Subject: Nonroad engines emission estimates for proposed Scorpion Bay Marina at Lake Pleasant

Dear Sandra:

Over the past few weeks, Maricopa County Air Quality Department (MCAQD) has been in discussions with the Bureau of Reclamation on the best way to estimate criteria air pollution emissions from pleasure craft that are expected as a result of the completion of the proposed Scorpion Bay Marina at Lake Pleasant. EPA's NONROAD2005 model provides the latest available method for calculating emissions from nonroad engines, such as pleasure craft. At the request of the Bureau of Reclamation, MCAQD ran the NONROAD2005 model (core version 2005a, Feb. 2006) using local survey data compiled by the Bureau of Reclamation detailing the number and size of engines expected to populate the Scorpion Bay Marina when it achieves full capacity in 2015.

EPA's guidance on the NONROAD2005 model recommends that default equipment population and activity levels be changed if local data is available.

"Surveys better capture the actual activity on local lakes, rivers, and other waterways, as well as account for boats registered in one county but used in another. If States, regional air organizations, and local air pollution control districts have such types of data, then EPA is interested in learning about them. Furthermore, EPA encourages state, regional, and local air organizations to use these local data in the NONROAD model for county-level boat populations, subject to the appropriate guidance." (*Geographic Allocation of Nonroad Engine Population Data to the State and County Level, NR-014d*, EPA420-R-05-021, December 2005)

In response to this guidance, MCAQD modified the default NONROAD2005 model pleasure craft population values to reflect the expected population at the proposed marina, as provided by the Bureau of Reclamation. EPA also cautions that when modifying population numbers in the NONROAD2005 model, activity levels should also be examined to reflect local data. The default activity levels for pleasure craft were examined and determined to be representative of local activity for all engine types except auxiliary diesel sailboat engines; subsequently, only auxiliary diesel sailboat engines activity levels were adjusted to reflect local conditions.

Maricopa County Air Quality Department Emissions Inventory Unit 1001 N. Central Ave., Ste. 400 Phoenix, Arizona 85004 Phone: (602) 506-6790 Fax: (602) 506-6985

MCAQD ran the NONROAD2005 model on February 16, 2007 with the adjusted population and activity levels provided by the Bureau of Reclamation. The results of the model are presented in Table 1.

				Boat					
SCC	Equipment Type	Engine Type	CO	VOC	NOx	SOx	PM10	PM25	Popualtions
2282005010	Outboard	2 Stroke	14.62	7.68	0.54	0.00	0.09	0.08	111
2282005015	Personal Water Craft	2 Stroke	4.10	0.73	0.13	0.00	0.01	0.01	14
2282010005	Inboard/Sterndrive	4 Stroke	278.31	44.60	19.01	0.05	0.16	0.14	843
2282020005	Inboard/Sterndrive	Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0
2282020010	Outboards	Diesel	0.05	0.01	0.09	0.00	0.01	0.01	138
2282000000	All	-	297.07	53.03	19.78	0.05	0.26	0.24	1106

Table 1.	Scorpion	Bay M	larina 2	2015	Annual	Emissions	and	Boat	Populations
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In addition to estimating emissions from the proposed marina, MCAQD also estimated the emissions that would occur in the nonattainment and maintenance areas based on the percentage of Lake Pleasant surface water that occupies each area (percentages provided by the Bureau of Reclamation, based on Lake Pleasant at the 1702 level). The results are presented in Table 2.

Table 2. Scorpion	n Bay Marina	contribution to nonattainmen	t and	l maintenance area	emissions
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Percent of Lake Pleasant surface water in			'yr)				
nonattainment/maintenance	СО	VOC	NOx	SOx	PM10	PM25	
CO maintenance area	21.00%	62.39	n/a	n/a	n/a	n/a	n/a
8-hour ozone nonattainment area	46.00%	136.65	24.39	9.10	п/а	n/a	n/a
PM10 nonattainment area	46.00%	n/a	n/a	9.10	0.03	0.12	0.11

If you have any further questions, please feel free to contact me at 602-506-6707.

Sincerely,

Matt Poppen Air Quality Planner Maricopa County Air Quality Department

ADJUSTMENTS MADE SUBSEQUENT TO RECEIPT OF MCAQD LETTER

The following tables reflect adjustments Reclamation made to Tables 1 and 2 included in MCAQD's letter dated February 16, 2007, in which MCAQD provided Reclamation with the results of its NONROAD2005 model run substituting Reclamation-provided local survey data for the model's default values. These adjustments include (1) adding 18 personal watercraft (80 percent to 4-stroke 100- to 175-horsepower inboard; 20 percent to 2-stroke 100- to 175-horsepower outboard), and (2) changing the percentage of Lake Pleasant that falls within the PM_{10} nonattainment area from 46 percent to 51 percent.

MCAQD TABLE 1 Adjusted for 88 Personal Watercraft									
SCC	Equipment	Engine	CO	VOC	NOx	SOx	PM ₁₀	PM ₂₅	Boat
	Туре	Туре							Pop.
2282005010	Outboard	2-stroke	14.62	7.68	0.54	0.00	0.09	0.08	111
2282005015	PWC	2-stroke	5.27	0.94	0.17	0.00	0.01	0.01	18
2282010005	Inboard/sterndrive	4-stroke	282.93	45.34	19.33	0.05	0.16	0.14	857
2282020005	Inboard/sterndrive	Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0
2282020010	Outboards	Diesel	0.05	0.01	0.09	0.00	0.01	0.01	138
	Total motors								1124
2282000000	Total emissions (tons/year)	-	302.87	53.97	20.12	0.05	0.28	0.25	

MCAQD TABLE 2 Adjusted for 88 Personal Watercraft (tons/year)										
% of Lake Pleasant surface wate	CO	VOC	NOx	SOx	PM ₁₀	PM ₂₅				
nonattainment/maintenance area										
CO maintenance area	21%	63.60	n/a	n/a	n/a	n/a	n/a			
8-hr ozone nonattainment area	46%	139.32	24.83	9.26	n/a	n/a	n/a			
PM ₁₀ nonattainment area	51%	n/a	n/a	10.26	0.03	0.14	0.13			

Scorpion Bay Marina & Yacht Club Draft Environmental Assessment for Construction Air Quality (PM-10) Emissions

2/19/2007

De Minimis Limit for serious nonattainment is 70 tons/year

CONSTRUCTION EMISSIONS

Vehicle Emissions for dump trucks hauling stone to fill sites

Using 0.2672 g/mi for Heavy Duty Diesel Vehicles 7 Table 5.4.1.3 including Exh, Tire & Brake emissions (Maricopa County 2005 PM10 Inventory)

200000 cy hauled x	0.1 trip/cy =	20000 trips
1 miles/trip x	20000 trips =	20000 miles
20000 miles x	0.2672 g/mile =	5344 grams
5344 grams x	0.002205 lbs/gram =	11.78 lbs
11.7835 lbs x	0.0005 tons/lbs =	0.01 tons

Fugitive Dust from dump trucks hauling stone to fill sites

Using 3.2 lb/VMT PM10 Emission Factor (EF) from 2005 Emission Inventory Help Sheet for Vehicle Travel on Unpaved Roads using Heavy-Duty Vehicles (construction) traveling at 15 mph

Using 70% control efficiency (per help sheet - a control efficiency of 70% is allowed for regular watering)

0.1 trip/cy =	20000 trips
20000 trips =	20000 VMT
3.2 lb/VMT =	64000 lbs of uncontrolled emission
0.3 control eff. =	19200 lbs of controlled emission
0.0005 tons/lbs =	9.6 tons of controlled emission
	0.1 trip/cy = 20000 trips = 3.2 lb/VMT = 0.3 control eff. = 0.0005 tons/lbs =

Quarrying Operations

Per AP 42 Chapter 11.19.2 page 10 "Emission factors for stone quarry blasting are not presented because of the sparsity and unreliability of available tests. While a procedure for estimating blasting emissions is presented in Section 11.9, Western Surface Coal Mining, that procedure should not be applied to stone quarries because of dissimilarities in blasting techniques, material blasted, and size of blast areas.

Fugitive Dust for drilling of insitu stone for blasting

Using 0.00008 lb/Ton of material of throughput PM10 Emission Factor (EF) from Table 11.19.2-2 Emission Factors for Crushed Stone Processing Operations, AP 42, Volume I, Fifth Edition

Using 70% control efficiency with water

200000 cy hauled x	27 cf/cy =	5400000 cubic feet
5400000 cubic feet x	150 lb/cf =	810000000 lbs of material throughput
8.1E+08 lbs x	0.0005 tons/lbs =	405000 tons of material throughput
405000 tons x	0.000080 lb/ton =	32.4 lbs of uncontrolled emission
32.4 lbs x	0.3 control eff. =	9.72 lbs of controlled emission
9.72 lbs x	0.0005 tons/lbs =	0.00486 tons of controlled emission

Construction Activities

42 acres total construction activity 6 month duration w. emission factor of 0.11 tons PM10/acre-month for **site prep / land development** Per Table 3.3-18 of the Jan. 2007 Public Review Draft of 2005 Periodic PM10 Emission Inventory Using 70% control efficiency with water

42	acres x	6 months =	252 acre-months (a-m)
252	a-m x	0.11 tons/a-m =	27.72 tons uncontrolled emission
27.72	tons x	0.3 control eff. =	8.316 tons controlled emission

Fugitive Dust for loading stone into dump trucks (included in the land development activities) Using 0.000016 lb/Ton of material of throughput PM10 Emission Factor (EF) from Table 11.19.2-2 Emission Factors for Crushed Stone Processing Operations, AP 42, Volume I, Fifth Edition

Using 70% control efficiency with water

200000 cy hauled x	27 cf/cy =	5400000 cubic feet
5400000 cubic feet x	150 lb/cf =	810000000 lbs of material throughput
810000000 lbs x	0.0005 tons/lbs =	405000 tons of material throughput
405000 tons x	0.000016 lb/ton =	6.48 lbs of uncontrolled emission
6.48 lbs x	0.3 control eff. =	1.944 lbs of controlled emission
1.944 lbs x	0.0005 tons/lbs =	0.000972 tons of controlled emission

Fugitive Dust for dumping stone at fill sites (included in the land development activities) Using 0.000016 lb/Ton of material of throughput PM10 Emission Factor (EF) from Table 11.19.2-2 Emission Factors for Crushed Stone Processing Operations, AP 42, Volume I, Fifth Edition

Using 70% control efficiency with water

200000	cy hauled x	27	cf/cy =	5400000	cubic feet
5400000	cubic feet x	150	lb/cf =	81000000	lbs of material throughput
81000000	lbs x	0.0005	tons/lbs =	405000	tons of material throughput
405000	tons x	0.000016	lb/ton =	6.48	lbs of uncontrolled emission
6.48	lbs x	0.3	control eff. =	1.944	lbs of controlled emission
1.944	lbs x	0.0005	tons/lbs =	0.000972	tons of controlled emission

2 acres total Commercial Construction Activity for installation of docks and supply store. 6 month duration w. emission factor of 0.19 tons PM10/acre-month for commercial construction Per Table 3.3-18 of the Jan. 2007 Public Review Draft of 2005 Periodic PM10 Emission Inventory Using 70% control efficiency with water

2 acres x	6 months =	12 acre-months (a-m)
12 a-m x	0.19 tons/a-m	2.28 tons uncontrolled emission
2.28 tons x	0.3 control eff. =	0.684 tons controlled emission

Total PM-10 emissions from construction activities =

18.61 tons controlled emissions

These calculations are very conservative. The grading is expected to take 3 months, not 6 as shown. And we anticipate moving 170,000 cy of rock, not the 200,000 cy as shown.

Scorpion Bay Marina & Yacht Club Draft Environmental Assessment for Construction Air Quality (PM-10) Emissions

De Minimis Limit for serious nonattainment is 70 tons/year

RECURRING EMISSIONS

Nonroad Mobile Sources

Pleasure Craft Emissions

Per NONROAD2005 model with local survey data, as adjusted:

0.28 tons/year x 51% =

Vehicle Emissions for fork lift to haul boat to/from water

Using 0.2672 g/mi for Heavy Duty Diesel Vehicles 7 Table 5.4.1.3 including Exh, Tire & Brake emissions (Maricopa County 2005 PM10 Inventory)

80 boats/day x	1 mile/boat	80 miles/day
80 miles/day x	365 days/year =	29200 miles/vear
29200 miles/year x	0.2672 g/mi =	7802.24 grams/year
7802.24 grams/year x	0.002205 lbs/gram =	17.20 lbs/year
17.2039 lbs/year x	0.0005 tons/lbs =	0.01 tons/year

Fugitive Dust from fork lift to haul boat to/from water

Using 3.2 lb/VMT PM10 Emission Factor (EF) from 2005 Emission Inventory Help Sheet for Vehicle Travel on Unpaved Roads using Heavy-Duty Vehicles (construction) traveling at 15 mph

Using 70% control efficiency (per help sheet - a control efficiency of 70% is allowed for regular watering)

80 boats/day x	1 mile/boat	80 miles/day
80 miles/day x	365 days/year =	29200 VMT/year
29200 VMT/year x	3.2 lb/VMT =	93440 lbs of uncontrolled emission per year
93440 lbs x	0.3 control eff. =	28032 lbs of controlled emission per year
28032 lbs x	0.0005 tons/lbs =	14.02 tons of controlled emission per year

0.14 tons per year

Onroad Mobile Sources

10 mile roundtrip with 200 trips/day (20% of total # of boats)
Using 0.0266 g/mile emissions from Light Duty Gas Truck 1 Table 5.4.1.3 including Exh, Tire & Brake emissions (Maricopa County 2005 PM10 Inventory)
Using 1.54 g/VMT for fugitive dust on low ADT non-freeway paved roadway Section 5.4.2 (Maricopa County 2005 PM10 Inventory)
Using 0.29 lb/VMT PM10 Emission Factor (EF) from 2005 Emission Inventory Help Sheet for Vehicle Travel on Unpaved Roads using Light-Duty Vehicles (customers) traveling at 10 mph

Total Reoccurring PM-10 Emissions =	=	16.03 tons/year i	in nonattainment area
3724.56 lbs/year x	0.0005 tons/lbs =	1.86 tons/year	produced in maintenance area
4010 lbs/year x	30% Dust Supp.	1203 lbs/year co	ntrolled emission
13826 VMT x	0.29 Ib/VMT	4010 lbs/year un	controlled emission
37.88 miles/day x	365 days/year =	13826 miles/year	(VMT)
200000 feet/day x	0.0001894 miles/foot =	37.88 miles/day	
1000 feet/trip x	200 trips/day =	200000 feet/day	
Unpaved Parking Lot			
1124200 grams/year x	0.002205 lbs/gram =	2478.86 lbs/year	
730000 VMT/year x	1.54 g/VMT =	1124200 grams/yea	r
2000 VMT/day x	365 days/year =	730000 VMT/year	
10 miles/trip x	200 trips/day =	2000 VMT/day	
Reentrained Dust			
19418 grams/year x	0.002205 lbs/gram =	42.82 lbs/year	
/30000 miles/year x	0.0266 g/mile =	19418 grams/yea	Ir
2000 miles/day x	365 days/year =	730000 miles/year	ar Ba
10 miles/trip x	200 trips/day =	2000 miles/day	
Vehicle Emissions			

Scorpion Bay Marina & Yacht Club Draft Environmental Assessment for Construction Air Quality (Ozone) Emissions

De Minimis Limit for all other areas outside an ozone transport region is 100 tons/year

CONSTRUCTION EMISSIONS

Vehicle Emissions for dump trucks hauling stone to fill sites Using 1.114 g/mi emission factor for Heavy Duty Diesel Vehicle on local roads traveling at 12.9 mph.

200000	cy hauled x	0.1	trip/cy =	20000 tri	ps
1	miles/trip x	20000	trips =	20000 m	iles
20000	miles x	1.114	g/mile =	22280 ar	ams
22280	grams x	0.002205	lbs/gram =	49.13 lb	S
49.1274	lbs x	0.0005	tons/lbs =	0.02 to	ns

RECURRING EMISSIONS

Nonroad Mobile Sources

Pleasure Craft Emissions

Per NONROAD2005 model with local survey data, as adjusted:

74.09 tons/year x 46% =

34.08 tons/year produced in nonattainment area

Onroad Mobile Sources

Vehicle Emissions

10 mile roundtrip with 200 trips/day (20% of total # of boats) Using 1.721 g/mile for NOx emissions from light duty gas truck Table 5.5-7 of 2002 Periodic Ozone Emission Inventory for Maricopa County Using 2.096 g/mile for VOCs emissions from light duty gas truck Table 5.5-3 of 2002 Periodic Ozone Emission Inventory for Maricopa County

10	miles/trip x	200	trips/day =	2000	miles/dav
2000	miles/day x	365	days/year =	730000	miles/vear
730000	miles/year x	1.721	g/mile =	1256330	grams/year of NOx
1256330	grams/year x	0.002205	lbs/gram =	2770.21	lbs/year
10	miles/trip x	200	trips/day =	2000	miles/day
2000	miles/day x	365	days/year =	730000	miles/vear
730000	miles/year x	2.096	g/mile =	1530080	grams/vear of VOCs
1530080	grams/year x	0.002205	lbs/gram =	3373.83	lbs/year
6144	lbs/year x	0.0005	tons/lbs =	3.07	tons/year produced in nonattainment area

2/19/2007

Vehicle Emissions for fork lift to haul boat to/from water

1 mile roundtrip with 80 trips/day (40% of total # of boats in Dry Stack Building) Using 15.660 g/mile for NOx emissions from heavy duty diesel vehicle Table 5.5-7 of 2002 Periodic Ozone Emission Inventory for Maricopa County Using 1.097 g/mile for VOCs emissions from heavy duty diesel vehicle Table 5.5-3 of 2002 Periodic Ozone Emission Inventory for Maricopa County

1 miles/trip x	80 trips/day =	80 miles/day
80 miles/day x	365 days/year =	29200 miles/year
29200 miles/year x	15.66 g/mile =	457272 grams/year of NOx
457272 grams/year x	0.002205 lbs/gram =	1008.28 lbs/year
1 miles/trip x	80 trips/day =	80 miles/day
80 miles/day x	365 days/year =	29200 miles/year
29200 miles/year x	1.097 g/mile =	32032.4 grams/year of VOCs
32032.4 grams/year x	0.002205 lbs/gram =	70.63 lbs/year
1079 lbs/year x	0.0005 tons/lbs =	0.54 tons/year produced in nonattainment area

Total Reoccurring Ozone Emissions =

37.69 tons/year produced in nonattainment area

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2/19/2007

Scorpion Bay Marina & Yacht Club Draft Environmental Assessment for Construction Air Quality (Carbon Monoxide) Emissions

De Minimis Limit for all nonattainment & maintenance areas is 100 tons/year On 1-5-05 EPA redesignated Phoenix to attainment for CO

CONSTRUCTION EMISSIONS

Construction Sources - none

Construction will occur outside the maintenance area (there would be 12.34 tons if included)

RECURRING EMISSIONS

Onroad Mobile Emissions - none will occur in the maintenance area The 10-mile round-trip is on Castle Hot Springs Road, west of the maintenance area

Nonroad Mobile Sources

Pleasure Craft Emissions

Per NONROAD2005 model with local survey data, as adjusted:

302.9 tons/year x	21% =	63.60 tons/year produced in maintenance area
Total Recurring CO Emissions =		63.60 tons/year produced in maintenance area

SOURCES FOR EMISSION FACTORS USED:

- Environmental Protection Agency. (1995; updated annually). Compilation of air pollutant emission factors, AP-42, Fifth Edition, Volume I: Stationary point and area sources. Research Triangle Park, NC.
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- Maricopa County. (2007). 2005 Periodic emissions inventory for PM₁₀ for the Maricopa County, Arizona, nonattainment area – Public review draft. Phoenix, Arizona. Retrieved January 31, 2007, from <u>http://www.maricopa.gov/aq/divisions/planning_analysis/emissions_inventory/Default.aspx</u>