APPENDIX IV

LAND USE/LAND COVER	AREAS IN HUC-11 SUBWATERSHEDS (ACRES)							
	010	020	030	040	050	060	070	080
Deciduous Forest	15,289	37,729	17,625	21,122	21,064	7,861	26,207	16,724
Evergreen Forest	1,890	10,306	1,397	3,524	6,593	1,837	3,575	7,107
High Intensity:								
Commercial/Industrial/Transportation	550	188	63	367	138	4	146	33
High Intensity: Residential	103	2	1	34	4			
Low Intensity: Residential	693	308	102	597	108	3	145	156
Mixed Forest	4,539	17,327	3,973	6,796	11,243	4,141	7,971	10,144
Open Water	274	472	442	316	182	3	38	11
Other Grasses:								
Urban/Recreational	567	400	27	490	201		201	68
Pasture/Hay	5,554	6,257	5,301	7,318	1,323	89	6,245	2,098
Row Crops	702	783	442	742	219		1,394	308
Transitional	6	413	55	227	174		213	89
Woody Wetlands	506	68	788					
Emergent Herbaceous Wetlands	2	6	8					
Quarries/Strip Mines				244	68			
Total	**30,676**	**74,259**	**30,225**	**41,776**	**41,317**	**13,939**	**46,136**	**36,740**

LAND USE/LAND COVER	AREAS IN HUC-11 SUBWATERSHEDS (ACRES)					
	090	100	110	120	130	140
Deciduous Forest	10,343	38,050	2,686	25,126	16,390	6,692
Evergreen Forest	8,327	6,624	549	2,621	4,286	2,521
High Intensity:						
Commercial/Industrial/Transportation	25	88	3	201	47	16
High Intensity: Residential		4		55		
Low Intensity: Residential	71	184	5	572	18	6
Mixed Forest	10,794	11,634	1,221	6,177	7,219	2,329
Open Water	39	6	82	26	20	2
Other Grasses:						
Urban/Recreational	17	87	2	605	15	5
Pasture/Hay	2,460	1,605	40	3,276	1,570	951
Row Crops	263	332	2	790	87	81
Transitional	203	113	3	71	98	3
Woody Wetlands					165	
Emergent Herbaceous Wetlands						
Quarries/Strip Mines						
Total	**32,543**	**58,726**	**4,592**	**39,519**	**29,917**	**12,606**

Table A4-1. Land Use Distribution in Emory River Watershed by HUC-11. *Data are from 1992 Multi-Resolution Land Characterization (MRLC) derived by applying a generalized Anderson Level II system to mosaics of Landsat thematic mapper images collected every five years.*

HYDROLOGIC SOIL GROUPS
GROUP A SOILS have low runoff potential and high infiltration rates even when wet. They consist chiefly of sand and gravel and are well to excessively drained. **GROUP B SOILS** have moderate infiltration rates when wet and consist chiefly of soils that are moderately deep to deep, moderately to well drained, and moderately coarse to coarse textures. **GROUP C SOILS** have low infiltration rates when wet and consist chiefly of soils having a layer that impedes downward movement of water with moderately fine to fine texture. **GROUP D SOILS** have high runoff potential, very low infiltration rates, and consist chiefly of clay soils.

Table A4-2. Hydrologic Soil Groups in Tennessee as Described in WCS.

STATION	HUC-11	NAME	AREA (SQ MILES)	PERIOD OF OBSERVATIONS	FLOW (CFS)		
					Min	Max	Mean
03538800	06010208010						
03538600	06010208010	Obed River	12.0		0		
03539800	06010208020	Obed River	518.0	05/01/57-12/31-87	1.0	45,000.0	1,027.0
03538900	06010208030						
03539500	06010208040	Daddys Creek	93.5	10/01/30-09/30/58	0	7,940.0	174.0
03539600	06010208050	Daddys Creek	139.0	05/01/57-09/30/68	0	7,910.0	261.0
03538500	06010208100	Emory River	83.2	06/01/34-09/30/68	0	9,100.0	145.0
03540500	06010208110	Emory River	764.0	07/01/27-09/30/94	0	103,000	1,475.0
03541300	06010208150	Bitter Creek	12.6	04/01/67-07/08/75	0	3,000.0	32.0

Table A4-3. Historical USGS Streamflow Data Summary Based on Mean Daily Flows in Emory River Watershed. *Min, absolute minimum flow for period of record.*

PARAMETER ID	PARAMETER NAME
00010	Water Temperature (Degrees Centigrade)
00061	Flow, Stream, Instantaneous (cfs)
00065	Stream Stage (Feet)
00080	Color (Platinum-Cobalt Units)
00094	Specific Conductance, Field (µmhos/cm @ 25° C)
00095	Specific Conductance, Field (µmhos/cm @ 25° C)
00299	Oxygen, Dissolved, Analysis by Probe (mg/L)
00300	Oxygen, Dissolved (mg/L)
00310	BOD 5 Day @ 20° C (mg/L)
00335	COD (Low Level) in .025 N $K_2Cr_2O_7$ (mg/L)
00340	COD (High Level) in .025 N $K_2Cr_2O_7$ (mg/L)
00400	pH (Standard Units)
00410	Alkalinity, Total (mg/L as $CaCO_3$)
00431	Alkalinity, Total Field (mg/L as $CaCO_3$)
00515	Residue, Total Filtrable (mg/L)
00530	Residue, Total Nonfiltrable (mg/L)
00605	Nitrogen, Organic, Total (mg/L as N)
00608	Nitrogen Ammonia , Dissolved (mg/L as N)
00610	Nitrogen Ammonia , Total (mg/L as N)
00613	Nitrite Nitrogen, Dissolved (mg/L as N)
00619	Ammonia, Unionized (Calculated From Temp-pH-NH_4; mg/L)
00620	Nitrate Nitrogen, Total (mg/L as N)
00623	Nitrogen, Kjeldahl, Dissolved (mg/L as N)
00625	Nitrogen, Kjeldahl, Total (mg/L as N)
00630	Nitrite Plus Nitrate, Total (1 Determination mg/L as N)
00631	Nitrite Plus Nitrate, Dissolved (1 Determination mg/L as N)
00665	Phosphorus, Total (mg/L as P)
00666	Phosphorus, Dissolved (mg/L as P)
00671	Phosphorus, Dissolved Orthophosphate (mg/L as P)
00680	Carbon, Total Organic (mg/L as C)
00900	Hardness, Total (mg/L as $CaCO_3$)
00915	Calcium, Dissolved (mg/L as Ca)
00916	Calcium, Total (mg/L as Ca)
00925	Magnesium, Dissolved (mg/L as Mg)
00927	Magnesium, Total (mg/L as Mg)
00929	Sodium, Total (mg/L as Na)
00930	Sodium, Dissolved (mg/L as Na)
00935	Potassium, Dissolved (mg/L as K)
00937	Potassium, Total (mg/L as K)
00940	Chloride, Total In Water (mg/L)
00941	Chloride, Dissolved in Water (mg/L)
00945	Sulfate, Total (mg/L as SO_4)
00946	Sulfate, Dissolved (mg/L as SO_4)
00950	Fluoride, Dissolved (mg/L as F)
00955	Silica, Dissolved (mg/L as SiO_2)
01002	Arsenic, Total (µg/L as As)
01007	Barium, Total (µg/L as Ba)
01025	Cadmium, Dissolved (µg/L as Cd)
01027	Cadmium, Total (µg/L as Cd)
01034	Chromium, Total (µg/L as Cr)
01040	Copper, Dissolved (µg/L as Cu)
01042	Copper, Total (µg/L as Cu)
01045	Iron, Total (µg/L as Fe)

01046	Iron, Dissolved (µg/L as Fe)
01049	Lead, Dissolved (µg/L as Pb)
01051	Lead, Total (µg/L as Pb)
01065	Nickel, Dissolved (µg/L as Ni)
01067	Nickel, Total (µg/L as Ni)
01075	Silver Dissolved (µg/L as Ag)
01077	Silver Total (µg/L as Ag)
01090	Zinc, Dissolved (µg/L as Zn)
01092	Zinc, Total (µg/L as Zn)
01105	Aluminum, Total (µl as Al)
01106	Aluminum, Dissolved (µl as Al)
01147	Selenium, Total (µl as Se)
31616	Fecal Coliform (Membrane Filter, M-FC Broth at 44.5^{o} C)
31613	Fecal Coliform (Membrane Filter, M-FC Agar at 44.5^{o} C, 24 h)
31625	Fecal Coliform (Membrane Filter, M-FC, 0.7 UM)
31673	Fecal Streptococci, (Membrane Filter, KF Agar, at 35°C, 48h)
39086	Alkalinity, Water, Dissolved, Field Titration (mg/l as $CaCO_3$)
70300	Residue, Total Filtable (Dried at 180°C, as mg/L)
70507	Phosphorus, in Total Orthophosphate (mg/L as P)
71845	Nitrogen, Ammonia, Total (mg/L as NH_4)
71900	Mercury, Total (µg/L as Hg)
80154	Suspended Sediment (Evaporation at 110°C, as mg/L)
82078	Turbitity, Field (as Nephelometric Turbidity Units, NTU)
82079	Turbitity, Lab (as Nephelometric Turbidity Units, NTU)

Table A4-4a. Water Quality Parameters and Codes.

PARAMETER ID	SUBWATERSHED					
	010	**020**	**050**	**060**	**080**	**090**
00010	a	b,c,d,e,f	e,g,h,j	k	l,m,n,o,p,r	s,t
00061	a		g,j	k	o,r	
00065					l	
00080			j	k	o	
00094			j	k	o	
00095	a	b,c,d,e,f	e,g,h		l,m,n,p,r	s,t
00299		c,d,f	h		n	s,t
00300		b,e	i,g,j	k	l,m,o,p,r	
00310					q	
00335			i,j		q	
00340		e				
00400		b,e	g,i,j	k	l,m,o,p,r	
00410		c,d,f	h,j	k	n,o,q	s,t
00515			j	k	o	
00530		e	i,j	k	o,p,q	
00605					q	
00608		b	g		l,m,r	
00610			j	k	o,q	
00613		b	g		l,m,r	
00619		b	g,j	k	l,m,o,r	
00620						
00623		b	g		l,m,r	
00625		b,e	g,i		l,m,p,r	
00630		e	i,j	k	o,p,q	
00631		b	g		l,m,r	
00665		b,e	g,i,j	k	l,m,o,p,q,r	
00666		b	g		l,m,r	
00671		b	g		l,r	
00900		c,d,e,f	h,i,j	k	n,o,p	s,t
00915		b	g		m,r	
00916					q	
00925		b	g		m,r	
00927					q	
00930		b	g		m,r	
00935		b	g		m,r	
00940		b,c,d,f	g,h		m,n,o,q,r	s,t
00945		b,c,d,f	g,h,j	k	n,o,q,r	s,t
00946		e	i		p	
00950		b	g		m,r	
00955		b	g		m,r	
01002			j	k	o,q	
01007					q	
01025					q	
01027		e	i,j	k	o,p,q	
01034			j	k	o,q	
01040					q	
01042		e	i,j	k	o,p,q	
01045		e	i,j	k	o,p,q	
01046		e	g		m,r	
01049					q	
01051		e	i,j	k	o,p,q	
01065					q	

01067		e	i,j		o,p,q	
01075					q	
01077					q	
01090					q	
01092		e	j	k	o,p,q	
01105		e	i,j		q	
01147					q	
31613		e	i		p	
31616		c,d,f	h,j	k	n,o	s,t
31625		b	g		l,m,r	
31673		b,e	g,i		m,r	
39086		b	g		l,m,r	
70300		e	g,i		m,p,q	
70507					q	
71845		e	i		p	
71900		e	i,j		o,p,q	
80154		b	g		m,r	
82078		c,d,f	h		n	s,t
82079		e	i		p	

PARAMETER ID	SUBWATERSHED		
	100	**110**	**120**
00010	u,v,w	x,y,z,#,$	*
00061	wu	y	*
00065		$	
00080	w	$	*
00094	w	$	*
00095	u,v	x,y,z,#	
00299	v	x,#	
00300	u,w	y,z,$	*
00310			
00335		$	
00340		z	
00400	u,w	y,z,$	*
00410	v,w	x,#	*
00431		$	
00515	w		*
00530	w	z,$	*
00605		$	
00608	u	y	
00610	w	$	*
00613	u	y	
00619	u,w	y,$	*
00620			
00623	u	y	
00625	u	y,z	
00630	w	z,$	*
00631	u	y	
00665	u,w	y,z,$	*
00666	u	y	
00671	u	y,$	
00680		$	
00900	v,w	x,z,#	*

00915	u	y,$	
00916		$	
00925	u	y,$	
00927		$	
00929		$	
00930	u	y	
00935	u	y	
00937		$	
00940	u,v	x,y,$,#	*
00941		$	
00945	u,v,w	x,y,#,$	*
00946		z,$	
00950	u	y	
00955	u	y	
01002	w		*
01007			
01025		$	
01027	w	z	*
01034	w		*
01040		$	
01042	w	z,$	*
01045	w	z,$	*
01046	u	y,$	
01049		$	
01051	w	z	*
01065		$	
01067		z	*
01075		$	
01077			
01090		$	
01092	w	z,$	*
01105		z,$	
01106		$	
01147			
31613		z	
31616	v,w	x,#,$	*
31625	u		
31673	u	z	
39086	u	y	
70300	u	y,z,$	
70507			
71845		z	
71900		z	*
80154	u	y	
82078	v	x,#,$	
82079		z,$	

Table A4-4b. Water Quality Parameters Monitored in the Emory River Watershed.

CODE	STATION	ALIAS	AGENCY	LOCATION
a	03538600		USGS	Obed River @ Crossville
b	03538860		USGS	Obed River @ Potter Ford
c	OBRI_NPS_OR-2		NPS	Obed River @ Potter Bridge
d	OBRI_NPS_OR-3		NPS	Obed River Upstream of Adams Bridge
e	OBRI_DEC_OR		NPS	Obed River @ Potter Ford
f	OBRI_NPS_OC-1		NPS	Otter Creek @ Catoosa Road Bridge
g	03539690		USGS	Daddys Creek @ Devils Breakfast Table
h	OBRI_NPS_DC-2		NPS	Daddys Creek @ Devils Breakfast Table
i	OBRI_DEC_DC		NPS	Daddys Creek @ Devils Breakfast Table
j	ECO68a26	DADDY002.3CU	TDEC	Daddys Creek @ RM 2.3
k	ECO68a27		TDEC	Island Creek
l	03539778		USGS	Clear Creek @ Lilly Bridge
m	03539717		USGS	Clear Creek @ Norris Ford
n	OBRI_NPS_CC-1		NPS	Clear Creek @ Lilly Bridge
o	ECO68a08		TDEC	Clear Creek @ RM 4.0
p	OBRI_DEC_CC		NPS	Clear Creek @ Jett Access
q	475146		TVA	Clear Creek @ RM 1.54
r	03539735		USGS	Clear Creek @ Waltman Ford Bridge
s	OBRI_NPS_WH-1		NPS	Mouth of White Creek
t	OBRI_NPS_CC-2		NPS	Clear Creek @ Barnett Bridge
u	03538580		USGS	Emory River Near Lancing
v	OBRI_NPS_ER-2		NPS	Emory River Upstream of Mouth of Obed
w	ECO68a28		TDEC	Rock Creek off Hwy 62
x	OBRI_NPS_ER-1		NPS	Emory River @ Nemo Bridge
y	03540500		USGS	Emory River @ Oakdale
z	OBRI_DEC_ER		NPS	Emory River @ Oakdale
#	OBRI_NPS_RC-1		NPS	Mouth of Rock Creek above Barnett Bridge
$	475838		TVA	Emory River @ Oakdale
^	477320		TVA	Emory River Near Morgan/Roane County Line
*	ECO69d03		TDEC	Flat Fork Creek

Table A4-4c. Water Quality Monitoring Stations in the Emory River Watershed*. TDEC, Tennessee Department of Environment and Conservation; USGS, United States Geologic Survey; TVA, Tennessee Valley Authority; NPS, National Park Service.*

FACILITY NUMBER	FACILITY NAME	SIC	SIC NAME	MADI	WATERBODY	HUC-11
TN0024996	Crossville STP	4952	Sewerage Systems	Major	Obed River @ RM38.6	06010208010
TN0067296	Nakano Foods	2099	Other	Minor	Proctor Creek @ RM 2.2	06010208020
TN0067831	Crab Orchard UD	4941	Water Supply	Minor	Otter Creek Reservoir	06010208020
TN0055981	Holiday Out RV Park	4952	Sewerage Systems	Minor	Basses Creek @ RM 6.2	06010208030
TN0025615	Fairfield Glade STP	4952	Sewerage Systems	Minor	Bagwell Branch @ RM 0.8	06010208040
TN0022471	Cincinnatti, New Orleans and TX STP	4952	Sewerage Systems	Minor	Emory River @ RM 18.6	06010208110
TN0058530	Oakdale Housing Project STP	4952	Sewerage Systems	Minor	Laurel Branch @ RM 0.3	06010208110
TN0023051	Oakdale School	4952	Sewerage Systems	Minor	RM 0.4 of UT to RM 0.8 of another UT to RM 16.5 of Emory River	06010208110
TN0068438	American Kraft Mills of TN	2679	Other Converted Paper And Paperboard Products Such	Minor	Emory River @ RM 11.3	06010208110
TN0059528	Morgan County Correctional Facility STP	4952	Sewerage Systems	Minor	Crooked Fork @ RM 6.0	06010208120
TN0059765	Brushy Mountain Prison STP	4952	Sewerage Systems	Minor	Stockstill Creek @ RM 1.15	06010208120
TN0028622	Wartburg STP	4952	Sewerage Systems	Minor	Crooked Fork Creek @ RM 6.3	06010208120
TN0061620	Oliver Springs WTP	4941	Water Supply	Minor	UT to Brushy Fork to Poplar Creek @ RM 19.1	06010208150
TN0023078	Coalfield School	4952	Sewerage Systems	Minor	Davis Branch @ RM 0.2	06010208150
TN0004863	Cumberland County UD	4941	Water Supply	Minor	Little Emory River @ Watts Bar Reservoir	06010208150

Table A4-5. Active Permitted Point Source Facilities in the Emory River Watershed. *SIC, Standard Industrial Classification; MADI, Major Discharge Indicator.*

FACILITY NUMBER	FACILITY NAME	SIC	SIC NAME	WATERBODY	HUC-11
TN0047392	Highland Sand Co.	1442	Construction Sand and Gravel	Meadow Creek	06010208040
TN0052591	Regency Coal Co.	1221	Bituminous Coal and Lignite Surface Mining	Goodstock Branch	06010208040
TN0063622	Taylor Bros. Sand Co.	1442	Construction Sand and Gravel	Meadow Creek	06010208040
TN0063631	Franklin Industrial Minerals	1422	Crushed and Broken Limestone	Karst Topography	06010208050
TN0004472	A.B. Long Quarries	1422	Crushed and Broken Limestone	Emory River	06010208110
TN0052388	A&W Auger Corporation	1221	Bituminous Coal and Lignite Surface Mining	Taylor Branch	06010208120
TN0053538	Laurel Fork Mining Co.	1222	Bituminous Coal Underground Mining	Summers Branch	06010208120
TN0045900	B&D Mining Co.	1221	Bituminous Coal and Lignite Surface Mining	Summers Branch	06010208120

Table A4-6. Active Permitted Mining Sites in the Emory River Watershed. *SIC, Standard Industrial Classification.*

LOG NUMBER	COUNTY	DESCRIPTION	WATERBODY	HUC-11
98.339	Cumberland	Extension of Box Culvert	Little Obed River	06010208010
99.224	Cumberland	Utility Line Crossing	Obed River	06010208020
99.475	Cumberland	Minor Road Crossing	Trib to Black Drowning Creek	06010208020
00.134	Cumberland	Box Culvert	Black Drowning Creek	06010208020
98.559	Cumberland	Utility Line Crossing	Daddys Creek	06010208030
98.315	Cumberland	Impoundment	Trib to North Creek	06010208040
97.893	Roane	Impoundment	Emory River	06010208110
98.448	Morgan	Water Line Crossing	Emory River	06010208110

Table A4-7. Individual ARAP Permits Issued January 1994 Through June 2000 in Emory River Watershed.

PERMIT #	COUNTY	DATE ISSUED	SITE	IMPACTED ACRES	IMPACTED WATER	MITIGATION	HUC-11
95.49700	Cumberland	09/15/1995	Hwy 127 Near Crossville	0.86	Obed River	Off-Site	06010208010

Table A4-8. Individual ARAP Permits Issued for Impacting Wetlands in Emory River Watershed.