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SCE&G®
A SCANA COMPANY

January 6, 2010
NND-10-0001

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

ATTN: Document Control Desk

Subject: Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3 Combined License Application (COLA) - Docket Numbers 52-027 and 52-028
Voluntary Submittal to Provide Updated Final Safety Analysis Report (FSAR) Section 11.2

References:
1. Letter from Ronald B. Clary (SCE&G) to Document Control Desk (NRC), Submittal of Revision 1 of the Combined License Application for V. C. Summer Nuclear Station Units 2 and 3, dated July 30, 2009 (ML092170504).

2. Letter from Ronald B. Clary (SCE&G) to Document Control Desk (NRC), Response to Environmental Report Audit Information Needs: G-3, GW-4, HP-6, HP-10, HP-11, LU-4, and SE-1, dated June 1, 2009 (ML091550479).

The enclosure to this letter provides a draft copy of Revision 2 to the VSCNS Units 2 and 3 FSAR, Section 11.2, "Liquid Waste Management Systems". These updates are provided to be consistent with the most recent liquid effluent dose analysis, which was revised to address NRC review comments for the Environmental Report (ER) and to provide responses to information needs, specifically, Information Need HP-10.

Should you have any questions, please contact Mr. Alfred M. Paglia by telephone at (803) 345-4191, or by email at apaglia@scana.com.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 6th day of January, 2010.

Sincerely,

Ronald B Clary

Ronald B. Clary
Vice President
New Nuclear Deployment

D083
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Enclosure

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Enclosure 1

Draft Revision 1 of VCSNS Units 2 and 3 FSAR Section 11.2

13 Total Pages

11.2 LIQUID WASTE MANAGEMENT SYSTEMS

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

11.2.1.2.5.2 Use of Mobile and Temporary Equipment

Add the following information at the end of DCD Subsection 11.2.1.2.5.2:

STD COL 11.2-1 When mobile or temporary equipment is selected to process liquid effluents, the equipment design and testing meets the applicable requirements of Regulatory Guide 1.143. When confirmed through sampling that the radioactive waste contents do not exceed the A_2 quantities for radionuclides specified in Appendix A to 10 CFR Part 71, the liquid effluent may be processed with mobile or temporary equipment in the Radwaste Building. When the A_2 quantities are exceeded, liquid effluent is processed in the Seismic Category I auxiliary building.

Mobile and temporary equipment are designed in accordance with the applicable mobile and temporary radwaste treatment systems guidance provided in Regulatory Guide 1.143, including the codes and standards listed in Table 1 of the Regulatory Guide.

Mobile and temporary equipment have the following features:

- Level indication and alarms (high-level) on tanks.
- Screwed connections are permitted only for instrument connections beyond the first isolation valve.
- Remote operated valves are used where operations personnel would be required to frequently manipulate a valve.
- Local control panels are located away from the equipment, in low dose areas.
- Instrumentation readings are accessible from the local control panels (i.e., temperature, flow, pressure, liquid level, etc.).
- Wetted parts are 300 series stainless steel, except flexible hose and gaskets.
- Flexible hose is used only for mobile equipment within the designated "black box" locations between mobile components and at the interface with the permanent plant piping.

- The contents of tanks are capable of being mixed, either through recirculation or with a mixer.

- Grab sample points are located in tanks and upstream and downstream of the process equipment.

Inspection and testing of mobile or temporary equipment is in accordance with the codes and standards listed in Table 1 of Regulatory Guide 1.143 with the following additions:

- After placement in the station, the mobile or temporary equipment is hydrostatically, or pneumatically, tested prior to tie-in to permanent plant piping.

- A functional test, using demineralized water, is performed. Remote operated valves are stroked (open-closed-open or closed-open-closed) under full flow conditions. The proper function of the instrumentation, including alarms, is verified. The operating procedures are verified correct during the functional test.

- Tank overflows are routed to floor drains.

- Floor drains are confirmed to be functional prior to placing mobile or temporary equipment into operation.

11.2.3.3 Dilution Factor

Add the following information at the end of DCD Subsection 11.2.3.3.

VCS COL 11.2-2 The dilution factors used for the maximum exposed individual and the population dose are calculated by the LADTAP II code in accordance with Regulatory Guide
VCS COL 11.5-3 1.113. LADTAP II input requires information on whether effluent discharge is into a river or lake, and the average flow rate.

In calculating the effluent doses, it is assumed that there~~There~~ is no dilution of the effluent discharge prior to entering the Broad River at the Parr Reservoir. Neglecting the blowdown flow rate of 6,000 gpm, the~~The~~ effluent discharge is assumed to be directly diluted by the flow rate of the Broad River. The minimum annual average flow rate of the Broad River is 1782~~4811~~ cfs. The Parr Reservoir retention time is four days.

The dilution factors and a summary of parameters used to calculate them are presented in Table 11.2-201.

11.2.3.5 Estimated Doses

Replace the information in DCD Subsection 11.2.3.5 with the following paragraphs and subsections.

VCS COL 11.2-2 Dose and dose rate to man was calculated using the LADTAP II computer code. This code is based on the methodology presented in Regulatory Guide 1.109.
VCS COL 11.5-3 Factors common to both estimated individual dose rates and estimated population dose are addressed here. Unique data are discussed in the respective sections.

Activity pathways considered are drinking water, sport fishing, irrigated farm products, and recreational activities.

The irrigated farm products are vegetables, leafy vegetables, milk, and meat.

Drinking water from the Broad River is consumed by half the population of the city of Columbia and all the population of Fort Jackson using data from the state of South Carolina. The farm production is based on data for vegetables, leafy vegetables, milk, and meat from the state of South Carolina. The food production within the 50-mile radius of VCSNS is based on the total food production in each category multiplied by the ratio of the land area within the 50-mile radius (adjusted for nonproduction areas) to the total land area of the state. An irrigation model is used for food products. The food production rate using irrigation water is determined by multiplying the 50-mile production rates by the ratio of population using drinking water to the total population within the 50-mile radius, and the fraction of irrigated to harvested cropland using data from the state of South Carolina.

11.2.3.5.1 Estimated Individual Dose Rate

Dose rates to individuals are calculated for drinking water, sport fish consumption, irrigated farm products, and recreational activities.

Table 11.2-202 contains LADTAP II input data for dose rate calculations.
Table 11.2-203 gives the maximum individual dose rates.

The total site doses due to liquid and gaseous effluents from the existing Unit 1 and Units 2 and 3 would be well within the regulatory limits of 40 CFR Part 190, as shown in Table 11.3-206. The values in this table for Unit 1 are representative based on review of the Unit 1 annual radiological operating reports (Reference 202).

11.2.3.5.2 Estimated Population Dose

The population dose is based on the fraction of the 50-mile population that will be exposed to the evaluated pathways. These pathways are drinking water, recreational activities, irrigated farm products, and sport fishing.

The sport fishing harvest is estimated using data from the state of South Carolina. The sport fishing harvest is estimated to be 3.77×10^5 kg/yr. Recreational activities include swimming, boating, and shoreline use. The annual usage for each of these activities is estimated to be 3.59×10^5, 3.59×10^6, and 3.59×10^6 person-hours, respectively.

The population doses are given in Table 11.2-204.

Table 11.2-204 shows that the total body and thyroid population doses per unit are approximately 14.6~~5.4~~ and 6.5~~2.4~~ person-rem per unit, respectively.

11.2.3.5.3 Liquid Radwaste Cost Benefit Analysis Methodology

STD COL 11.2-2 The application of the methodology of Regulatory Guide 1.110 was used to satisfy the cost benefit analysis requirements of 10 CFR Part 50, Appendix I, Section II.D. The parameters used in calculating the Total Annual Cost (TAC) are fixed and are given for each radwaste treatment system augment listed in Regulatory Guide 1.110, including the Annual Operating Cost (AOC) (Table A-2), Annual Maintenance Cost (AMC) (Table A-3), Direct Cost of Equipment and Materials (DCEM) (Table A-1), and Direct Labor Cost (DLC) (Table A-1). The following variable parameters were used:

- Capital Recovery Factor (CRF) — This factor is taken from Table A-6 of Regulatory Guide 1.110 and reflects the cost of money for capital expenditures. A cost-of-money value of 7 percent per year is assumed in this analysis, consistent with the "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission" (NUREG/BR-0058). A CRF of 0.0806 was obtained from Table A-6.

- Indirect Cost Factor (ICF) — This factor takes into account whether the radwaste system is unitized or shared (in the case of a multi-unit site) and is taken from Table A-5 of Regulatory Guide 1.110. It is assumed that the radwaste system for this analysis is a unitized system at a 2-unit site, which equals an ICF of 1.625.

- Labor Cost Correction Factor (LCCF) — This factor takes into account the differences in relative labor costs between geographical regions and is taken from Table A-4 of Regulatory Guide 1.110. A LCCF of 1.0 (the lowest value) is assumed in this analysis.

Appendix I to 10 CFR Part 50 prescribes a $1,000 per person-rem criterion for determining the cost benefit of actions to reduce radiation exposure.

The analysis used a conservative assumption that the respective radwaste treatment system augment is a "perfect" system that reduces the effluent and dose by 100 percent. The liquid radwaste treatment system augments annual costs were determined and the lowest annual cost considered a threshold value.

The lowest-cost option for liquid radwaste treatment system augments is a 20 gpm Cartridge Filter at $11,140 per year, which yields a threshold value of 11.14 person-rem total body or thyroid dose from liquid effluents.

For AP1000 sites with population dose estimates less than 11.14 person-rem total body or thyroid dose from liquid effluents, no further cost-benefit analysis is needed to demonstrate compliance with 10 CFR 50, Appendix I Section II.D.

11.2.3.5.4 Liquid Radwaste Cost Benefit Analysis

VCS COL 11.2-2 The population doses are given in Table 11.2-204. As discussed above, the lowest cost liquid radwaste system augment is $11,140. Assuming 100 percent efficiency of this augment, the minimum possible cost per person-rem is determined by dividing the cost of the augment by the population dose. This is $11,140/14.6 person-rem total body or $763 per person-rem total body, and $11,140/6.5 person-rem thyroid or $1,714 per person-rem thyroid. The cost per person-rem total body does not exceed the $1000 per person-rem criterion provided in Regulatory Guide 1.110, and therefore requires evaluation. The augment that requires evaluation is the 20 gpm cartridge filter. Of the 14.6 person-rem total body dose, 4.6 person-rem is due to tritium, which will not be mitigated by the 20 gpm cartridge filter. Assuming this augment completely eliminates the dose of 10 person-rem total body due to isotopes other than tritium, the cost of total body dose reduction is $11,140/10 person-rem total body or $1,114 per person-rem total body. Therefore this augment is not cost-beneficial in reducing the total body dose. ~~This is $2,060 per person-rem total body ($11,140/5.4 person-rem) and $4,640 per person-rem thyroid ($11,140/2.4 person-rem). These costs per person-rem reduction exceed the $1,000 per person-rem criterion prescribed in Appendix I to 10 CFR Part 50 and are therefore not cost beneficial.~~

11.2.3.6 Quality Assurance

STD SUP 11.2-1 Add the following to the end of DCD Subsection 11.2.3.6:

Since the impact of radwaste systems on safety is limited, the extent of control required by Appendix B to 10 CFR Part 50 is similarly limited. Thus, a supplemental quality assurance program applicable to design, construction, installation and testing provisions of the liquid radwaste system is established by procedures that complies with the guidance presented in Regulatory Guide 1.143.

11.2.5 COMBINED LICENSE INFORMATION

11.2.5.1 Liquid Radwaste Processing by Mobile Equipment

STD COL 11.2-1 This COL Item is addressed in Subsection 11.2.1.2.5.2.

11.2.5.2 Cost Benefit Analysis of Population Doses

STD COL 11.2-2 This COL Item is addressed in Subsection 11.2.3.5.3.

VCS COL 11.2-2 This COL Item is addressed in Subsections 11.2.3.3, 11.2.3.5, 11.2.3.5.1, 11.2.3.5.2, and 11.2.3.5.4.

11.2.6 REFERENCES

201. Deleted.

202. Annual Effluent and Waste Disposal Report, Virgil C. Summer Nuclear Station, for the Operating Period January 1, 2005 – December 31, 2005; April 2006.

VCS COL 11.2-2

Table 11.2-201
Dilution Factor Parameters and Dilution Factors

Parameter	Average Annual Condition
Broad River Flow Rate (cfs)[a]	17824~~811~~
Dilution Factor[a]	1

a) Assumed fully mixed model with annual average Broad River flow rate at Alston, SC for 1981-20081~~982 and 1997-2006~~, United States Geological Survey, 20092~~007~~.

VCS COL 11.2-2
VCS COL 11.5-3

Table 11.2-202 (Sheet 1 of 2)
LADTAP II Input[a]

Input Parameter	Value
Freshwater Site	Selected
Release source terms	DCD Table 11.2-7
Discharge Flow Rate	1782~~4811~~ $ft^3 s^{-1}$
Transit time to receptor	0.1, 96 hours[b]
Impoundment reconcentration model	None
50-mile population	FSAR Figures 2.1-211 and 2.1-219[c]
Shore width factor	0.2
Fish consumption	21 kg per year[d]
Drinking water consumption	730 liters per year[d]
Sport fishing harvest	3.77E+05 kg per year[e]
Commercial fishing harvest	1.21E+07 kg per year
50-mile drinking water population	299,930[f]
50-mile shoreline usage	3.59E+06 person-hours per year[g]
50-mile swimming usage	3.59E+05 person-hours per year[h]
50-mile boating usage	3.59E+06 person-hours per year[i]
Fraction of SC crops irrigated[j]	0.0696
Fraction of population using contaminated water for drinking and food production[k]	0.141
Fraction of SC agricultural products within 50 mi radius	0.258
Irrigation rate for food products[l]	110~~102~~ liters per square meter per month
Fraction of contaminated water not used for feed or drinking water	0

VCS COL 11.2-2
VCS COL 11.5-3

Table 11.2-202 (Sheet 2 of 2)
LADTAP II Input[a]

Input Parameter	Value
Total production of vegetables within 50 mi radius[m]	6.86E+07 kg per year
Production rate for irrigated vegetables[n]	6.71E+05 kg per year
Total production of leafy vegetables within 50 mi radius[o]	1.80E+07 kg per year
Production rate for irrigated leafy vegetables[n]	1.76E+05 kg per year
Total production of milk within 50 mi radius[p]	6.78E+07 liters per year
Production rate for irrigated milk[n]	6.63E+05 liters per year
Total production of meat within 50 mi radius[q]	9.15E+08 kg per year
Production rate for irrigated meat[n]	8.96E+06 kg per year

a) Input parameters not specified use default LADTAP II values.
b) 0.1 hours assumed for maximally exposed individual (MEI) at the Parr Reservoir. 96 hours for downstream users reflecting reservoir retention time.
c) 2060 population projection.
d) Values in the table are for adult MEI. Average values of fish and water consumption of 6.9 kg and 370 liters per year, respectively, are used for population doses.
e) Boating population x 21 kg per year (adult MEI fish ingestion rate).
f) 2060 population projection.
g) Assumed same as boating usage.
h) Assumed 10% of shoreline usage.
i) Assumed 10% of boats registered in Fairfield, Lexington, Newberry, and Richland counties, 2 persons per boat, 200 hours per year.
j) USDA, National Agricultural Statistics Service, 2002 Census of Agriculture.
k) Fraction of contaminated water users (144,671) divided by the 50-mile population (1,028,075) in 2000.
l) 1 inch of water applied to the crops per week.
m) USDA, National Agricultural Statistics Service, 2005 and 2006, with apples and peaches included but leafy vegetables excluded, and projected to 2060.
n) Food product production rate multiplied by fraction of irrigated crops and fraction of contaminated water users.
o) USDA, Integrated Pest Management Center for leafy vegetables—2001, and projected to 2060.
p) *Milk Production, Disposition, and Income, 2006 Summary*, USDA, National Agricultural Statistics Service, April 2007, and projected to 2060. Density of producer milk is 1.03 kg per liter.
q) *South Carolina Agricultural Statistics, Crops, Livestock, and Poultry, 2005–2007*, USDA, National Agricultural Statistics Service. The total meat production in SC consists of broilers, turkey, commercial red meat, and young chickens. Projected to 2060.

VCS COL 11.5-3

Table 11.2-203 (Sheet 1 of 2)
Annual Individual Doses from Liquid Effluents (per Unit)

	Adult Dose (mrem/yr)							
Pathway	Skin	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
Fish		4.5E-02 ~~1.7E-02~~	7.8E-02 ~~2.9E-02~~	5.8E-02 ~~2.1E-02~~	5.9E-03 ~~2.2E-03~~	2.7E-02 ~~9.9E-03~~	9.2E-03 ~~3.4E-03~~	6.2E-03 ~~2.3E-03~~
Drinking		1.0E-03 ~~3.7E-04~~	2.9E-02 ~~1.1E-02~~	2.9E-02 ~~1.1E-02~~	4.1E-02 ~~1.5E-02~~	2.8E-02 ~~1.1E-02~~	2.8E-02 ~~1.0E-02~~	3.5E-02 ~~1.3E-02~~
Shoreline	6.7E-05 ~~2.5E-05~~	5.7E-05 ~~2.1E-05~~	5.7E-05 ~~2.1E-05~~	5.7E-05 ~~2.1E-05~~	5.7E-05 ~~2.1E-05~~	5.7E-05 ~~2.1E-05~~	5.7E-05 ~~2.1E-05~~	5.7E-05 ~~2.1E-05~~
Irrigated Vegetables		6.1E-03 ~~2.1E-03~~	2.9E-02 ~~1.0E-02~~	2.6E-02 ~~9.5E-03~~	2.6E-02 ~~9.5E-03~~	2.4E-02 ~~8.7E-03~~	2.1E-02 ~~7.6E-03~~	5.9E-02 ~~2.1E-02~~
Irrigated Leafy Vegetables		7.7E-04 ~~2.6E-04~~	3.5E-03 ~~1.3E-03~~	3.2E-03 ~~1.2E-03~~	4.9E-03 ~~1.7E-03~~	3.0E-03 ~~1.1E-03~~	2.6E-03 ~~9.4E-04~~	7.4E-03 ~~2.6E-03~~
Irrigated Milk		4.4E-03 ~~1.5E-03~~	1.9E-02 ~~7.0E-03~~	1.7E-02 ~~6.3E-03~~	2.2E-02 ~~7.9E-03~~	1.4E-02 ~~5.3E-03~~	1.3E-02 ~~4.7E-03~~	1.3E-02 ~~4.7E-03~~
Irrigated Meat		6.3E-03 ~~2.2E-03~~	5.1E-03 ~~1.9E-03~~	5.6E-03 ~~2.0E-03~~	4.5E-03 ~~1.7E-03~~	1.6E-02 ~~5.5E-03~~	4.3E-03 ~~1.6E-03~~	3.8E-01 ~~1.3E-01~~
Total	6.7E-05 ~~2.5E-05~~	6.3E-02 ~~2.3E-02~~	1.6E-01 ~~6.0E-02~~	1.4E-01 ~~5.1E-02~~	1.0E-01 ~~3.8E-02~~	1.1E-01 ~~4.1E-02~~	7.7E-02 ~~2.9E-02~~	5.0E-01 ~~1.7E-01~~

	Teen Dose (mrem/yr)							
Pathway	Skin	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
Fish		4.7E-02 ~~1.7E-02~~	8.0E-02 ~~3.0E-02~~	3.3E-02 ~~1.2E-02~~	5.5E-03 ~~2.0E-03~~	2.7E-02 ~~1.0E-02~~	1.1E-02 ~~3.9E-03~~	4.7E-03 ~~1.7E-03~~
Drinking		9.7E-04 ~~3.6E-04~~	2.1E-02 ~~7.7E-03~~	2.0E-02 ~~7.4E-03~~	3.1E-02 ~~1.1E-02~~	2.0E-02 ~~7.5E-03~~	2.0E-02 ~~7.3E-03~~	2.5E-02 ~~9.1E-03~~
Shoreline	3.8E-04 ~~1.4E-04~~	3.2E-04 ~~1.2E-04~~	3.2E-04 ~~1.2E-04~~	3.2E-04 ~~1.2E-04~~	3.2E-04 ~~1.2E-04~~	3.2E-04 ~~1.2E-04~~	3.2E-04 ~~1.2E-04~~	3.2E-04 ~~1.2E-04~~
Irrigated Vegetables		1.0E-02 ~~3.5E-03~~	3.9E-02 ~~1.4E-02~~	3.0E-02 ~~1.1E-02~~	3.4E-02 ~~1.2E-02~~	3.1E-02 ~~1.1E-02~~	2.6E-02 ~~9.5E-03~~	7.4E-02 ~~2.6E-02~~
Irrigated Leafy Vegetables		7.0E-04 ~~2.4E-04~~	2.6E-03 ~~9.3E-04~~	2.0E-03 ~~7.4E-04~~	3.6E-03 ~~1.3E-03~~	2.1E-03 ~~7.5E-04~~	1.7E-03 ~~6.4E-04~~	5.0E-03 ~~1.8E-03~~
Irrigated Milk		7.9E-03 ~~2.7E-03~~	2.9E-02 ~~1.0E-02~~	2.1E-02 ~~7.5E-03~~	3.2E-02 ~~1.1E-02~~	2.0E-02 ~~7.2E-03~~	1.7E-02 ~~6.3E-03~~	1.6E-02 ~~6.0E-03~~
Irrigated Meat		5.3E-03 ~~1.8E-03~~	3.2E-03 ~~1.2E-03~~	3.4E-03 ~~1.2E-03~~	2.8E-03 ~~1.0E-03~~	1.2E-02 ~~4.2E-03~~	2.6E-03 ~~9.5E-04~~	2.4E-01 ~~8.1E-02~~
Total	3.8E-04 ~~1.4E-04~~	7.2E-02 ~~2.6E-02~~	1.7E-01 ~~6.4E-02~~	1.1E-01 ~~4.0E-02~~	1.1E-01 ~~3.9E-02~~	1.1E-01 ~~4.1E-02~~	7.8E-02 ~~2.9E-02~~	3.6E-01 ~~1.3E-01~~

VCS COL 11.5-3

Table 11.2-203 (Sheet 2 of 2)
Annual Individual Doses from Liquid Effluents (per Unit)

	Child Dose (mrem/yr)							
Pathway	Skin	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
Fish		5.8E-02 ~~2.2E-02~~	7.0E-02 ~~2.6E-02~~	1.3E-02 ~~4.9E-03~~	5.6E-03 ~~2.1E-03~~	2.3E-02 ~~8.5E-03~~	8.4E-03 ~~3.1E-03~~	2.1E-03 ~~7.6E-04~~
Drinking		2.8E-03 ~~1.0E-03~~	4.0E-02 ~~1.5E-02~~	3.8E-02 ~~1.4E-02~~	6.4E-02 ~~2.4E-02~~	3.9E-02 ~~1.4E-02~~	3.8E-02 ~~1.4E-02~~	4.2E-02 ~~1.6E-02~~
Shoreline	7.9E-05 ~~2.9E-05~~	6.7E-05 ~~2.5E-05~~	6.7E-05 ~~2.5E-05~~	6.7E-05 ~~2.5E-05~~	6.7E-05 ~~2.5E-05~~	6.7E-05 ~~2.5E-05~~	6.7E-05 ~~2.5E-05~~	6.7E-05 ~~2.5E-05~~
Irrigated Vegetables		2.4E-02 ~~8.3E-03~~	6.2E-02 ~~2.2E-02~~	4.3E-02 ~~1.6E-02~~	5.7E-02 ~~2.1E-02~~	4.9E-02 ~~1.8E-02~~	4.1E-02 ~~1.5E-02~~	7.8E-02 ~~2.8E-02~~
Irrigated Leafy Vegetables		1.2E-03 ~~4.3E-04~~	3.1E-03 ~~1.1E-03~~	2.2E-03 ~~7.9E-04~~	4.8E-03 ~~1.7E-03~~	2.5E-03 ~~9.0E-04~~	2.1E-03 ~~7.6E-04~~	4.0E-03 ~~1.4E-03~~
Irrigated Milk		1.9E-02 ~~6.4E-03~~	4.6E-02 ~~1.7E-02~~	2.8E-02 ~~1.0E-02~~	5.6E-02 ~~2.0E-02~~	3.2E-02 ~~1.2E-02~~	2.7E-02 ~~9.9E-03~~	2.5E-02 ~~9.2E-03~~
Irrigated Meat		9.9E-03 ~~3.4E-03~~	3.9E-03 ~~1.4E-03~~	4.3E-03 ~~1.6E-03~~	3.4E-03 ~~1.3E-03~~	1.6E-02 ~~5.5E-03~~	3.1E-03 ~~1.2E-03~~	1.5E-01 ~~5.0E-02~~
Total	7.9E-05 ~~2.9E-05~~	1.2E-01 ~~4.1E-02~~	2.3E-01 ~~8.2E-02~~	1.3E-01 ~~4.8E-02~~	1.9E-01 ~~7.0E-02~~	1.6E-01 ~~5.9E-02~~	1.2E-01 ~~4.4E-02~~	3.0E-01 ~~1.0E-01~~

	Infant Dose (mrem/yr)							
Pathway	Skin	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
Fish		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Drinking		3.0E-03 ~~1.1E-03~~	4.0E-02 ~~1.5E-02~~	3.7E-02 ~~1.4E-02~~	7.9E-02 ~~2.9E-02~~	3.8E-02 ~~1.4E-02~~	3.7E-02 ~~1.4E-02~~	4.0E-02 ~~1.5E-02~~
Shoreline		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Total	0.0E+00	3.0E-03 ~~1.1E-03~~	4.0E-02 ~~1.5E-02~~	3.7E-02 ~~1.4E-02~~	7.9E-02 ~~2.9E-02~~	3.8E-02 ~~1.4E-02~~	3.7E-02 ~~1.4E-02~~	4.0E-02 ~~1.5E-02~~

	Maximum Dose (mrem/yr)[a]							
	Skin	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
Dose	3.8E-04 ~~1.4E-04~~	1.2E-01 ~~4.1E-02~~	2.3E-01 ~~8.2E-02~~	1.4E-01 ~~5.1E-02~~	1.9E-01 ~~7.0E-02~~	1.6E-01 ~~5.9E-02~~	1.2E-01 ~~4.4E-02~~	5.0E-01 ~~1.7E-01~~
Age Group	Teen	Child	Child	Adult	Child	Child	Child	Adult

a) Doses meet 10 CFR 50, Appendix I limits of 3 mrem for total body and 10 mrem for any organ

VCS COL 11.2-2

Table 11.2-204
Annual Population Doses from Liquid Effluents (per Unit)

Pathway	Population Dose (person-rem/yr)							
	Skin	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
Sport Fishing		9.87E-01 ~~3.7E-01~~	1.61E+00 ~~6.0E-01~~	9.87E-01 ~~3.7E-01~~	7.54E-02 ~~2.8E-02~~	5.44E-01 ~~2.0E-01~~	1.93E-01 ~~7.2E-02~~	1.03E-01 ~~3.8E-02~~
Commercial Fishing		8.97E+00 ~~3.3E+00~~	1.46E+01 ~~5.4E+00~~	8.95E+00 ~~3.3E+00~~	4.33E-01 ~~1.6E-01~~	4.93E+00 ~~1.8E+00~~	1.75E+00 ~~6.5E-01~~	8.95E-01 ~~3.3E-01~~
Drinking		1.96E-01 ~~7.3E-02~~	4.59E+00 ~~1.7E+00~~	4.49E+00 ~~1.7E+00~~	5.82E+00 ~~2.2E+00~~	4.47E+00 ~~1.7E+00~~	4.38E+00 ~~1.6E+00~~	5.26E+00 ~~2.0E+00~~
Hydrosphere Tritium		0.0E+00	7.70E-03 ~~7.7E-03~~	7.70E-03 ~~7.7E-03~~	7.70E-03 ~~7.7E-03~~	7.70E-03 ~~7.7E-03~~	7.70E-03 ~~7.7E-03~~	7.70E-03 ~~7.7E-03~~
Shoreline	2.01E-02 ~~7.5E-03~~			1.72E-02 ~~6.4E-03~~	1.72E-02 ~~6.4E-03~~			
Swimming				4.18E-05 ~~1.6E-05~~	4.18E-05 ~~1.6E-05~~			
Boating				2.09E-04 ~~7.7E-05~~	2.09E-04 ~~7.7E-05~~			
Irrigated Vegetables		1.21E-02 ~~4.1E-03~~	4.47E-02 ~~1.6E-02~~	3.71E-02 ~~1.4E-02~~	2.98E-02 ~~1.1E-02~~	3.46E-02 ~~1.3E-02~~	3.13E-02 ~~1.2E-02~~	7.60E-02 ~~2.7E-02~~
Irrigated Leafy Vegetables		2.63E-03 ~~9.0E-04~~	1.06E-02 ~~3.8E-03~~	9.28E-03 ~~3.4E-03~~	1.42E-02 ~~5.1E-03~~	8.76E-03 ~~3.2E-03~~	7.52E-03 ~~2.8E-03~~	2.08E-02 ~~7.4E-03~~
Irrigated Milk		1.66E-02 ~~5.7E-03~~	5.45E-02 ~~2.0E-02~~	4.12E-02 ~~1.5E-02~~	5.82E-02 ~~2.1E-02~~	3.87E-02 ~~1.4E-02~~	3.34E-02 ~~1.2E-02~~	3.25E-02 ~~1.2E-02~~
Irrigated Meat		1.25E-01 ~~4.3E-02~~	8.50E-02 ~~3.1E-02~~	9.30E-02 ~~3.4E-02~~	7.55E-02 ~~2.8E-02~~	2.78E-01 ~~9.8E-02~~	7.07E-02 ~~2.6E-02~~	5.80E+00 ~~2.0E+00~~
Total	2.01E-02 ~~7.5E-03~~	1.03E+01 ~~3.8E+00~~	2.10E+01 ~~7.8E+00~~	1.46+01 ~~5.4E+00~~	6.53E+00 ~~2.4E+00~~	1.03E+01 ~~3.8E+00~~	6.47E+00 ~~2.4E+00~~	1.22E+01 ~~4.4E+00~~