APPENDIX A

Sampling and Analysis Plan

SAMPLING AND ANALYSIS PLAN
2007 WILDFIRES - BURNED DEBRIS ASSESSMENT
SAN DIEGO AND SAN BERNARDINO COUNTIES, CALIFORNIA

PREPARED FOR:

California Environmental Protection Agency
Department of Toxic Substances Control
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DEPARTMENT OF TOXIC SUBSTANCES CONTROL

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engineers | scientists | innovators

27 November 2007

SAMPLING AND ANALYSIS PLAN
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I certify that this document and all attachments presented in this report are accurate and complete. This report was prepared by the staff of Geosyntec Consultants under my supervision to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who are directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

_____ 27 November 2007

Veryl Wittig — Date

California Professional Geologist No. 7115

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1. INTRODUCTION

As requested by the California Department of Toxic Substances Control (DTSC), Geosyntec Consultants (Geosyntec) prepared this sampling and analysis plan (SAP) to characterize residential areas burned during the October and November 2007 Wildfires in San Diego and San Bernardino Counties, California (2007 Southern California Wildfires). This SAP was prepared by Messrs. Veryl Wittig, PG, CHG, and Douglas Baumwirt, GIT, and has been reviewed by Mr. Sam Williams, PG, CHG, in accordance with the peer review policy of the firm. This SAP was also reviewed by staff from the United States Environmental Protection Agency (USEPA) and California Office of Environmental Health Hazard Assessment (OEHHA), California Office of Emergency Services (OES), and San Bernardino and san Diego Counties.

1.1 Background

On 21 October 2007, the Governor of California proclaimed a "State of Emergency" as a result of the 2007 Southern California Wildfires which occurred throughout seven counties (EO S-13-07). These fires burned more than 350,000 acres, destroyed more than 2,200 residential and commercial structures, and destroyed more than 2,000 vehicles in San Diego and San Bernardino Counties, alone.

The destruction left in the wake of these fires has the potential to result in widespread public exposure to toxic materials. Residents may be exposed to contaminants in burn debris and ash via dermal contact, ingestion, and inhalation exposure. With the pending winter rains comes the potential for surface water and groundwater contamination from the off-site migration of hazardous substances contained within the burn debris and ash. In addition, particulate matter in wind-entrained ash may also pose an inhalation risk.

Experiences from fires of a similar nature indicate that many hazardous substances may be found burned residential areas. Some of these substances include metal residue from batteries, treated wood, and melted plumbing; pesticides and herbicides from lawn and garden products; polycyclic aromatic hydrocarbons (PAHs), including dioxins and furans, from burned tires and plastics; asbestos from building materials; and polychlorinated biphenyls (PCBs) from appliances and automotive parts. Laboratory analysis of burned residential ash and debris following the 2003 San Diego County wildfires indicated the presence of elevated concentrations of certain PAHs as well as heavy metals, including antimony, arsenic, copper, lead and zinc. Concentrations of these constituents were present at levels exceeding statutorily-established health based criteria. A reasonable expectation is that the same types of hazardous substances will be detected following analysis of ash and debris from the 2007 Southern California Fires. If so, such data would warrant removal of these materials from affected communities in an expedited manner to protect public health and safety.

Federal Environmental Management Agency (FEMA) Disaster Assistance Policy 9523.13, "Debris Removal From Private Property," dated 18 July 2007, Sections 403(a)(3)(A) and 407 of the Stafford Act, 42 U.S.C. 5170b and 5173, respectively, provides FEMA authority to fund debris removal from private property provided that the State or local government arranges an unconditional authorization for removal of the debris, and agrees to indemnify the Federal government against any claim arising from the removal. The regulations implementing Sections 403 and 407 of the Stafford Act at 44 CFR 206.224 require that debris removal be in the "public interest" in order to be eligible for reimbursement. FEMA defines "public interest" as being necessary to: eliminate immediate threats to life, public health, and safety; eliminate immediate threats of significant damage to improved property; or ensure economic recovery of the affected community to the benefit of the community-at-1arge. In these situations, debris removal from private property may be considered to be in the public interest and thus may be eligible for reimbursement under the Public Assistance Program (44 CFR 206.224).

Geosyntec understands that State, County and local agencies including the DTSC, and Counties of San Diego and San Bernardino are interested in demonstrating that expedited removal of residual burned debris and ash resulting from the wildfires is in the "public interest" due to immediate threats to human health (primarily adult and children residents within and near the affected communities), public safety, and the environment (primarily water quality and air quality) posed by hazardous constituents in the residual burned debris and ash on improved properties.

1.2 Objectives

The objective of this SAP is to perform a representative characterization of the residual burned debris and ash in residential areas to assess the presence of hazardous constituents of concern (COCs). The concentrations of COCs in the burned ash and debris will be compared to statutorily-established human health-based screening levels such as the California Environmental Protection Agency (CalEPA) California Human Health Screening Levels for residential properties (residential CHHSLs), and United States Environmental Protection Agency (USEPA) Region IX Preliminary Remediation Goals for residential properties (residential PRGs). If COCs in the burned debris and ash are present at concentrations exceeding established residential CHHSLs or PRGs, then such data will be used in support of the determination of an immediate threat to public health and safety made by CalEPA and its boards, departments, and offices, according to FEMA Disaster Assistance Policy 9523.13.

The SAP will include a representative statistically-based sampling program developed to objectively characterize the hazards associated with burned debris and ash within two "typical" residential areas (one in San Diego County and one in San Bernardino County) affected by the 2007 Southern California Wildfires. By using a statistically-based

random sampling approach within "typical" burned residential areas, the conclusions based on the sample analyses may be generalized to all residential areas affected by the fires. Therefore, sampling within each fire area and in each affected local jurisdiction will not be necessary.

2. DESCRIPTION OF BURNED AREAS AND SAMPLING LOCATIONS

This section provides a general description of the burned areas, proposed sampling locations, and regulatory framework for sampling protocol.

2.1 Description of Burned Areas

Based on information provided to Geosyntec and obtained from the County of San Diego County Firestorm Recovery 2007 and Cal Fire websites, the 2007 Southern California Wildfires in San Diego and San Bernardino Counties burned more than 350,000 acres, destroyed more than 2,200 residential and commercial structures, destroyed more than 1,100 outbuildings (detached garages, barns, sheds and other structures), and destroyed more than 2,000 vehicles as summarized in the following table:

County	Fire	Acres Burned	Residential, Commercial, and Industrial Structures Destroyed	Outbuildings Destroyed	Vehicles, Trailers, Boats, Tractors, Destroyed
San Diego	Witch Creek	198,000	1,119	652	1,139
	Harris	90,000	283	172	293
	Poomacha	49,000	133	84	346
	Rice Canyon	10,000	240	249	232
	Coronado Hills	250	0	2	0
San Bernardino	Slide	13,000	272	3	Unknown
	Grass Valley	1,200	174	2	Unknown

2.2 Constituents of Concern

Based on sampling and laboratory analyses following the 2003 San Diego County Wildfires, metals (primarily arsenic, lead, zinc, copper, antimony), and polycyclic aromatic hydrocarbons (PAHs) (primarily benzo(a)anthracene, benzo(a)pyrene, and dibenz(a,h)anthracene) were the COCs most frequently detected at concentrations exceeding health-based screening levels. Therefore, Geosyntec was directed by CalEPA to use metals and PAHs for the laboratory analyses to be performed as described in this SAP.

Other constituents of potential concern (COPCs) in residential burned debris include pesticides and herbicides from lawn, garden and home products; asbestos from building materials, insulation, flooring and roofing materials; polychlorinated biphenyls (PCBs) from appliances, transformers, and automotive parts; polybrominated biphenyls (PBBs) used as flame retardants in textiles, carpets, and plastics; and dioxins and furans created by burning organic materials. These COPCs may be analyzed at a later date.

2.3 Sampling Areas

Representatives from each of San Diego and San Bernardino Counties designated the "typical" residential areas targeted for sampling in their respective county. The San Diego County sampling area will comprise the "Westwood" community in Rancho Bernardo, an area of single family homes within the City of San Diego where approximately 134 homes were destroyed in the fires (City of San Diego, 2007). The San Bernardino County sampling area will comprise the "Running Springs" area within the County of San Bernardino where approximately 161 homes were destroyed in the fires. Sampling will be performed on or near the footprint of the former structures (where the burn debris and ash is typically located) on the residential properties randomly selected within the two areas. In the case where burn debris and ash has been consolidated at the site within a stockpile or roll-off bin in preparation for offsite transport and disposal, samples will be collected following stockpile or containerized material sampling protocol summarized in Section 3.1.

2.4 Sample Size

There are three considerations in determining the appropriate sample size for estimating the mean (μ) using a confidence interval approach. First, the tolerable error establishes the desired width of the interval. The second consideration is the desired level of confidence in the results. The third consideration is the variability expected in the sampling data. Highly variable data increases the requirements for samples at a given confidence and interval width. If the confidence interval of μ is too wide, then the estimate of μ will be imprecise and not very informative. Similarly, a low level of confidence (say 50%) in an estimate will yield a confidence interval that very likely will be in error – that is, fail to contain μ. However, to obtain a confidence interval having a narrow width and a high level of confidence may require a large number of samples and hence may be technically and economically infeasible.

Variability in the concentrations of constituents in ash samples collected from residential properties affected by the 2003 wildfires were used to estimate the variance of constituent concentrations for the proposed samples. The coefficient of variation (CV) was used to estimate variability relative to the mean. The results for a few key COCs from the 2003 fires (including metals and PAHs) along with the median CV for all constituents are summarized in the following table. Constituents with large numbers of non-detects were not included in the median CV calculation.

Parameter	Lead	Fluoranthene	Fluorene	Naphthalene	Median All Constituents
Mean	5595 mg/kg	**393 MG/KG**	148 mg/kg	699 mg/kg	-
STD	16636 mg/kg	**1087 MG/KG**	288 mg/kg	906 mg/kg	-
CV	2.97	**2.74**	1.95	1.30	1.65

To estimate the number of samples (n) required to develop a statistically valid dataset for this assessment, the following formula was used:

$$n = \left(\frac{t_{1-\alpha/2} * CV}{p} \right)^2$$

where:

n = number of samples to obtain
t_{1}-$_{\alpha/2}$ = confidence level factor (1.96 for a 95 percent confidence level)
CV = coefficient of variation (STD/Mean) based on 2003 sampling data
p = acceptable margin-of-error

The tolerable error in the estimate is given as the margin-of-error relative to the estimated CV of the sample data. The tolerable error (p) is set at 0.6 (60% relative error)[1]. A confidence level of 95% was used for the purposes of the sample size derivation. This provides a reasonable certainty (95% or greater) that the sample mean interval contains the true mean (μ). Therefore, using the formula listed above, a median coefficient of variation (CV) of 1.65 based on the observed values from the 2003 dataset, and an acceptable margin of error of 0.6, the sample size required to estimate the mean concentration is estimated at 29 samples as follows:

$$\left(\frac{1.96 * 1.65}{0.6} \right)^2 = 29.05$$

The sampling variability from the 2003 ash sampling data is probably representative of the variability expected in the proposed sampling. However, individual constituents may have greater variability. Therefore, an estimated sample size of 35 was selected as a conservative number of burn debris and ash samples required to calculate the mean concentration for the COCs.

[1]Tolerable error is based on professional judgment for estimating environmental parameters of this type. This tolerable error level provides a sample size that corresponds to greater than 10% of the population of affected properties sampled. It also provides enough samples for subsequent distributional tests (goodness-of-fit tests) to have reasonable power.

The confidence limits to be used to assess the data will be generated from the sampling data to be collected during this assessment. Confidence bounds on the central tendency estimates will be constructed using the results of the distributional tests with the sampled data.

2.5 Sampling Locations

Sampling locations will be selected using a representative statistically-based sampling program developed to objectively characterize the hazards associated with burned debris and ash within two "typical" residential areas (one in San Diego County and one in San Bernardino County). Data quality objectives (DQOs) are presented in Attachment 1. The data will be collected in a manner such that conclusions based on the sample analyses may be generalized to all residential areas affected by the fires in each County. Therefore, sampling within each fire area and in each affected local jurisdiction will not be necessary.

A subset of parcels that contain a destroyed structure will be randomly identified from the total number of parcels with destroyed structures within each of the two sampling areas. From this subset, random parcels will be selected and designated as locations to have samples collected from the destroyed structure. The Random Selection Within Subsets tool in Hawth's Analysis Tools for ArcGIS Version 3.27 (Beyer, 2004) will be implemented to make the random selections. The tool will randomly select 35 parcels with destroyed residences from the Westwood-Rancho Bernardo area of San Diego County, and 35 parcels with destroyed residences in the Running Springs area of San Bernardino County as a sample size large enough to generally characterize the study areas. A list of 20 alternate parcels within each of the two areas will be randomly selected by the GIS system in advance of the field sampling. If one or more of the parcels randomly selected for sampling has already been cleared or are otherwise inaccessible due to limited access, safety concerns, or other limitations, an alternate sampling parcel will be selected from the list of 20 alternate parcels within each of the two areas. The list of randomly-selected parcels with fire-destroyed homes in the Westwood-Rancho Bernardo area of San Diego County is presented in Table 1. The list of randomly-selected parcels with fire-destroyed homes in the Running Springs area of San Bernardino County is presented in Table 2. Data generated from such parcels will provide a characterization of the COCs in a typical burned neighborhood, and will not be used for the purpose of characterizing hazardous material present at a specific parcel.

2.6 Regulatory Guidance

Established protocol for sampling burned debris on residential properties are not known to currently exist. Therefore, regulatory guidance including the California Integrated Waste Management Board (CIWMB) LEA Advisory #56 [CIWMB, 1998], and the

"Protocol for Burn Dump Site Investigation and Characterization," prepared by the DTSC [DTSC, 2003], were used for general guidance in evaluating constituents of concern, evaluating sampling protocol, and evaluating the threats posed by burn debris and ash to human health and the environment. Information regarding burn debris composition and estimated volumes of burned debris associated with burned residences were obtained from a document prepared to address removal of burned debris following the June 2007 Angora Fire in South Lake Tahoe, California [CIWMB, 2007]. Debris sampling protocol were reviewed from the USEPA Resource Conservation and Recovery Act (RCRA) Waste Sampling Guidance [USEPA, 2002]. Composite sampling protocol were reviewed from the USEPA Guidance on Choosing a Sampling Design for Environmental Data Collection [USEPA, 2002], and the San Diego County DEH Site Assessment and Mitigation (SAM) Manual [DEH, 2004].

3. FIELD SAMPLING

The following sections describe the sampling methodology, analytical parameters, and sample handling procedures to be followed. A project specific health and safety plan has been prepared and will be implemented to address potential hazards which may be encountered at the sampling sites and administrative or engineering controls for maintaining worker health and safety.

3.1 Sampling Methodology

Based on volume estimates derived during the 2007 Angora Fires [CIWMB, 2007], it is expected that burned sites will consist of burn ash and debris volumes resulting from burned residential structures and associated outbuildings will range from approximately 10 to 150 cubic yards (CY). Geosyntec understands that visible and retrievable household hazardous wastes were removed prior to sampling the remaining debris and ash. One composite sample will be collected from the footprint of each former structure based on the following criteria:

ESTIMATED BURN ASH/DEBRIS[2] VOLUME (CY)	COMPOSITE SAMPLE QUANTITY[3]
Less than 10	2
10 to 20	3
20 to 100	4
100 +	1 for each 25 CY

One composite sample consisting of two to six discrete ash or burn debris samples will be collected from the footprint of former structures at locations determined by a random number generator. At a minimum, one ash or burn debris sample will be collected from the location of the former garage vicinity for residential structures with attached garages. Outbuildings (e.g. detached garage, shed, barn, etc.), if present within the randomly selected parcels, will be sampled separately. An example field sampling form is attached (Attachment 2).

Upon arrival to a site to be sampled, the field team will identify the number of burned structures to be characterized within the randomly selected parcel and estimate the volume of ash and burn debris associated with each structure based on the dimensions of

[2]: Burn ash and debris does not include rock, concrete, brick, stucco, metal, or glass.

[3] : Number of discrete points comprising the composite sample was developed based on characterizing a known volume of material in a stockpile or container in accordance with San Diego County guidance.

the former structure(s). The footprint of each former structure within the randomly selected parcel will be divided into two to six approximately equal "cells" using the criteria listed in the preceding table. Using a random number generator, "x" and "y" sample location coordinates for each cell will be determined. To provide adequate sample volume to perform the necessary laboratory analyses, composite samples will consist of a minimum of 8 ounces of burn debris and ash. Approximately 4-ounces of ash or burn debris[4] at each random sampling location will be collected from the upper 6 to 12 inches of burn debris and ash using a new single-use stainless-steel spoon and placed into a new single-use stainless-steel mixing bowl for homogenization. Homogenization will consist of manually mixing the discrete samples until the composite sample appears thoroughly mixed based on a visual assessment. Following homogenization of the composite sample, the resulting material will be placed in an 8-ounce glass jar which will provide an adequate sample volume to perform the requested laboratory analyses. The sampling team will take photographs of each site sampled, and of the random sample locations at each site and record the photograph numbers on the field sampling log.

If the burn debris has been removed from the foundation of the structure and is stockpiled on the randomly-selected property, or placed within a roll-off bin on the randomly-selected property, a composite sample of the stockpile or bin will be collected[5]. For stockpiles and bins, the minimum number of samples comprising the composite sample is summarized as follows:

- Stockpiles/bins less than 10 cubic yards: 2 samples will be collected for compositing, one from each half of the stockpile/bin;
- Stockpiles/bins 10-20 cubic yards: 3 samples will be collected for compositing, one from each third of the stockpile/bin;
- Stockpiles from 20-100 cubic yards: 4 samples will be collected for compositing, one from each quarter of the stockpile/bin.

3.1.1 Analytical Parameters

Laboratory analyses will be performed by Calscience Environmental Laboratory in Garden Grove, California, a California Department of Public Health certified laboratory.

[4] : Materials to be sampled at each random sampling location will consist of approximately one 4-ounce jar of ash and fine-gravel-sized (0.75-inch) or smaller burn debris fragments. If ash or burn debris is not present at the random sampling location, an alternate random sampling point for the cell will be selected from a list of random sample coordinates.

[5] Since the process of stockpiling or placing the ash and burned debris within a bin will involve mixing materials from throughout the site and will essentially create a "composite" mass of ash and debris, samples will be collected from the upper six inches of material at the approximate center point of each half, third, or quarter of the stockpile or bin.

Each composite sample (estimated 70 samples total) will be analyzed for Title 22 metals (TTLC) by EPA Method 6010B and PAHs by EPA Method 8310. Laboratory method detection limits (MDLs) and reporting limits for the two analytical methods listed above are included in Attachment 3. With the exception of arsenic, the laboratory MDLs are less than the statutorily-established health based criteria described herein. If laboratory analyses by EPA Method 6010B indicates arsenic concentrations are less than the MDL, then those samples will be additionally analyzed for arsenic by EPA Method 7010 (MDL 0.062 mg/kg for arsenic) to achieve the DQOs described herein.

For quality assurance/quality control (QA/QC), each field team will collect one blind duplicate sample per day (six to eight duplicate samples total) for the analyses listed above to evaluate sampling and analytical precision. In addition, QC to be performed by the analytical laboratory to assess laboratory precision and accuracy will include method blanks, laboratory control spikes, and matrix spikes.

Method Blanks: A method blank is a laboratory-generated sample that assesses the degree to which laboratory operations and procedures cause false-positive analytical results for the samples. The method blank results associated with the samples will be included with the analytical results.

Laboratory Control Spike: A Laboratory Control Spike (LCS) is a sample that is spiked with known analyte concentrations, and analyzed at approximately 10 percent of the sample load in order to establish method-specific control limits. The LCS results associated with the samples will be attached on the LCS and LCS Duplicate Analysis Report.

Matrix Spike Results: A matrix spike is a sample that is spiked with known analyte concentrations and analyzed at approximately 10 percent of the sample load in order to establish method-specific control limits. The matrix spike results associated with the samples will be attached on the Matrix Spike and Matrix Spike Duplicate Analysis Report.

Accuracy: Accuracy will be measured by percent recovery as defined by:

$$\% \text{ recovery} = \frac{(\text{measured concentration}) \times 100}{(\text{actual concentration})}$$

3.2 Sample Handling

The following sections detail methods that are to be used for sample labeling, identification, containerizing, preservation, transportation, and maintaining proper chain of custody. Samples will be handled in accordance with standard EPA sampling protocol.

3.2.1 Sample Labeling and Identification

Each sample will be designated with a unique identification number and include the job number, sampler, date, and time of collection. The sample identification number will identify the County (San Bernardino or San Diego), site number (1 through 35) and date, (i.e., SD-03-11262007 identifies that this sample was collected from San Diego County Site No. 03 on 26 November 2007).

3.2.2 Sample Containers and Transportation

Following homogenization, burn debris samples will be placed in 8-ounce wide-mouth glass jars, sealed with Teflon-lined plastic lids. Sample jars will be labeled, sealed in plastic bags, stored on ice, and transported to the laboratory in a cooler. The individual who collects the samples will prepare them for shipment, complete the chain-of-custody form, and sign the form when transferring the samples to the laboratory courier.

3.2.3 Chain-of-Custody Procedures

A chain-of-custody form will be used to record possession of the samples from the time of collection to arrival at the laboratory. The samples will be released to the laboratory by signature on the chain-of-custody form. The laboratory control officer will verify all samples listed on the chain-of-custody form are present; verify sample integrity; and that proper sample preservation procedures are utilized.

3.3 Field Documentation

The following information about each sampling site will be documented on field forms (example attached):

- Field crew names;
- Date of sampling;
- Site address (if known) and Assessors Parcel number (if known);
- GPS coordinates of structure sampled;
- Sketch depicting footprint of structure sampled, garage location (if known), and approximate sample locations;
- Approximate ash and burn debris volumes at the site;
- Sample and photo identification numbers;
- Chain of custody number; and
- General observations.

4. PROJECT MANAGEMENT

4.1 Site Management and Project Schedule

4.1.1 Project Management

Mr. Veryl Wittig will serve as the project manager and will be responsible for daily operations and successful project execution. Mr. Sam Williams will serve as the project director and will be responsible for QA/QC for the project deliverables.

4.1.2 Training

All onsite workers will be required to have current 40-hour HAZWOPER certification prior to the commencement of work. Safety meetings will be held at the commencement of the project and each day before work begins to discuss safe work practices during field activities.

4.1.3 Project Schedule

Geosyntec is prepared to commence site sampling as early as 26 November 2007. Once initiated, the site sampling will be completed by two crews within five calendar days. Laboratory analyses will be performed on a normal turn-around basis (5 business days), unless expedited analyses are requested by DTSC. A draft report will be submitted to DTSC within seven business days of receipt of final laboratory data. The following tentative schedule has been prepared based on a start date of 26 November 2007.

ACTIVITY	TARGET COMPLETION DATE
Commence Sampling	26 November 2007
Complete Field Sampling	30 November 2007
Receive Final Laboratory Data	7 December 2007
Provide Draft Report to DTSC for Review	18 December 2007
Receive DTSC Comments on Draft Report	28 December 2007
Finalize and Distribute Report	7 January 2008

5. REFERENCES

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TABLE 1
RANDOMLY SELECTED PARCELS FOR BURN DEBRIS AND ASH SAMPLING
SAN DIEGO COUNTY SITES[1]

San Diego County Site No.	Assessor's Parcel Number	Address			Estimated Living Space Area of Destroyed Structure (ft^2)	Garage Size (2 or 3 car)
SD-01	6781413400	11529	PALITO	CT	2235	2
SD-02	6780900300	17857	CORAZON	PL	2142	2
SD-03	6781711600	18147	VALLADARES	DR	1560	2
SD-04	6781621700	17952	AGUAMIEL	RD	2679	2
SD-05	2737130400	17616	MATINAL	DR	2275	2
SD-06	2737130500	17608	MATINAL	DR	1819	2
SD-07	6781413700	11524	DANZA	CR	2091	2
SD-08	6781610200	17825	AGUAMIEL	RD	2298	2
SD-09	6781622900	17913	AGUAMIEL	RD	2142	2
SD-10	6783421000	17783	WEAVING	LN	1823	2
SD-11	6781711400	18167	VALLADARES	DR	1560	2
SD-12	6781420600	11479	ESCOBA	PL	2031	2
SD-13	6781424200	11552	ALIENTO	CT	2728	2
SD-14	6781623500	17865	AGUAMIEL	RD	2142	2
SD-15	6781425200	11540	DUENDA	RD	2031	2
SD-16	6781420700	11489	ESCOBA	PL	1419	2
SD-17	2737120100	11469	DUENDA	RD	1401	2
SD-18	6781511600	17943	CABELA	DR	2142	2
SD-19	6781421600	11457	ALIENTO	CT	1734	2
SD-20	6781520600	17927	CORAZON	PL	2949	2
SD-21	6781423000	11517	DANZA	CR	2219	2
SD-22	2737121400	11352	LUZ	PL	1854	2
SD-23	6781421700	11463	ALIENTO	CT	1419	2
SD-24	6781422200	11478	DUENDA	RD	2031	2
SD-25	2737110400	11363	LUZ	PL	1819	2
SD-26	6780903400	17838	CORAZON	PL	1792	2
SD-27	6781623600	17857	AGUAMIEL	RD	2298	2
SD-28	6781912100	17816	AZUCAR	WY	1808	2
SD-29	6781710800	11676	ANDANZA	WY	1745	2
SD-30	6781510400	18028	AGUAMIEL	RD	2376	2
SD-31	6781422800	11537	DANZA	CR	2031	2
SD-32	6782110100	17716	CRECIENTE	WY	2583	2
SD-33	6782606800	11420	LUZ	RD	2169	2
SD-34	6781413800	11534	DANZA	CR	2275	2
SD-35	6783511400	18187	SUN MAIDEN	CT	2857	3
Alternate Randomly-Selected Parcels with Burned Residences[2]						
SD-36	6781511100	17987	CABELA	DR	2679	2
SD-37	6783712700	18185	CHIEFTAIN	CT	3054	2
SD-38	6781510800	18013	CABELA	DR	1792	2
SD-39	6783411600	17893	PUEBLO VISTA	LN	2281	2
SD-40	6781910900	17885	AZUCAR	WY	1808	2
SD-41	6781421200	11454	ALIENTO	CT	1734	2
SD-42	6780902000	11419	DUENDA	RD	2222	2
SD-43	6781303400	11686	JOCATAL	CT	2103	2
SD-44	6780900200	17877	CORAZON	PL	2679	2
SD-45	6781912200	17824	AZUCAR	WY	2353	2
SD-46	6781520200	11454	GRILLO	CT	4842	3
SD-47	6781300800	17788	VALLADARES	DR	1560	2
SD-48	6781621800	17960	AGUAMIEL	RD	2017	2
SD-49	6781513000	11460	ALCALDE	CT	2823	2
SD-50	6781613100	17794	AGUAMIEL	RD	2136	2
SD-51	6781911100	17857	AZUCAR	WY	1921	2
SD-52	6781413200	11536	PALITO	CT	2031	2
SD-53	6781711200	18187	VALLADARES	DR	1560	2
SD-54	6780901800	11439	DUENDA	RD	1812	2
SD-55	6781623800	17841	AGUAMIEL	RD	2142	2

Notes:

1: Sites randomly selected from a list of 134 parcels with fire-destroyed residences identified by the City of San Diego

2: If a primary randomly selected site has already been cleared, or is inaccessible for sampling, randomly selected alternate sites will be substituted.

TABLE 2
RANDOMLY SELECTED PARCELS FOR BURN DEBRIS AND ASH SAMPLING
SAN BERNARDINO COUNTY SITES[1]

San Bernardino County Site No.	Assessor's Parcel Number	Address		Estimated Acreage
SB-01	029612131	55 PANORAMA	RD	0.09
SB-02	029509131	2404 WHISPERING PINES	DR	0.12
SB-03	029509219	31960 BROOKINGS	DR	0.13
SB-04	029626106	30651 FERNDALE	DR	0.48
SB-05	032837308	31393 EASY	ST	0.27
SB-06	032835114	31517 CIRCLE VIEW		0.22
SB-07	032835131	31474 VALLEY RIDGE	DR	0.19
SB-08	029601269	15 FREDALBA	RD	0.23
SB-09	029508318	2359 DEEP CREEK		0.15
SB-10	029508261	2356 DEEP CREEK	DR	0.13
SB-11	029508262	2379 CHICAGO	DR	0.54
SB-12	032837317	31432 RIM OF THE WORLD	DR	0.25
SB-13	029601266	14 FREDALBA	RD	0.23
SB-14	029601257	11 FREDALBA	RD	0.56
SB-15	029509221	31944 BROOKINGS	DR	0.11
SB-16	029631331	30444 LIVE OAK	DR	0.27
SB-17	032835211	31497 VALLEY RIDGE	DR	0.17
SB-18	029606109	0		6.15
SB-19	029509201	2429 WHISPERING PINES	DR	0.11
SB-20	029508232	31938 ENCINA	WY	0.10
SB-21	032835130	31482 VALLEY RIDGE	DR	0.21
SB-22	029630306	31034 OLD CITY CREEK	RD	0.46
SB-23	029607142	0		11.70
SB-24	032835121	2268 WILDERNESS	RD	0.16
SB-25	029507201	2391 SECRET	WY	0.12
SB-26	029601254	5 FREDALBA	RD	0.23
SB-27	029507208	2384 CHICAGO	DR	0.10
SB-28	029509133	2412 WHISPERING PINES	DR	0.14
SB-29	029509119	31879 ENCINA	WY	0.11
SB-30	029601240	30605 FREDALBA	RD	0.18
SB-31	029508214	2350 DEEP CREEK	DR	0.11
SB-32	029601279	17 FREDALBA	RD	0.23
SB-33	029606109	0		6.15
SB-34	029630304	31058 OLD CITY CREEK	RD	0.42
SB-35	032835140	2288 WILDERNESS	RD	0.44
Alternate Randomly-Selected Parcels with Burned Residences[2]				
SB-36	032834420	2206 WILDERNESS	RD	0.17
SB-37	032834401	31533 CIRCLE VIEW	DR	0.19
SB-38	029601241	7 FREDALBA	RD	0.12
SB-39	029509150	31923 ENCINA	WY	0.16
SB-40	029509224	31920 BROOKINGS	DR	0.07
SB-41	029508326	2333 DEEP CREEK	DR	0.15
SB-42	029508264	2336 DEEP CREEK	DR	0.25
SB-43	032835128	31500 VALLEY RIDGE	DR	0.22
SB-44	029601272	16 FREDALBA	RD	0.23
SB-45	029508218	2362 DEEP CREEK	DR	0.14
SB-46	032837106	31430 EASY	ST	0.19
SB-47	032809183	1891 NOB HILL	DR	2.35
SB-48	029508310	2365 DEEP CREEK	DR	0.11
SB-49	029630101	30910 OLD CITY CREEK	RD	0.45
SB-50	032835213	2310 WILDERNESS	RD	0.18
SB-51	029601288	18 FREDALBA	RD	1.01
SB-52	029509128	31951 ENCINA	WY	0.11
SB-53	029601238	4 FREDALBA	RD	0.00
SB-54	029601241	7 FREDALBA	RD	0.12
SB-55	029501101	2399 RIM OF THE WORLD	DR	0.13

Notes:

1: Sites randomly selected from a list of 161 parcels with fire-destroyed residences identified by the County of San Bernardino

2: If a primary randomly selected site has already been cleared, or is inaccessible for sampling, randomly selected alternate sites will be substituted.

ATTACHMENT 1
DATA QUALITY OBJECTIVES

DATA QUALITY OBJECTIVES

This section summarizes the data quality objective (DQO) process. The Burn Debris Sampling and Analysis Plan DQOs were developed based on our understanding of applicable requirements of the FEMA disaster relief reimbursement program. DQOs define and direct the burn debris sampling to comply with these requirements.

STEP 1: Problem Statement

The objectives of the sampling and analysis plan are to (1) characterize the hazardous components present in typical residential neighborhoods that have been destroyed by fire; and, (2) determine if concentrations of the constituents of concern (COCs) in residential and urban burn debris exceed health-based goals established in statute in California. These determinations will be made by the California Environmental Protection Agency (CalEPA) and its boards, departments, and offices in consultation with Geosyntec and the Planning Team Members (see below). The data will be used to support CalEPA and affected jurisdictions in their Public Interest Determinations, as required in the FEMA Disaster Assistance Policy 9523.13.

Planning Team Members include the following:

- Adam Palmer – California Department of Toxic Substances Control – Emergency Response Division
- Shelley DuTeaux – OEHHA
- Hedy Salter – USEPA
- Gary Erbeck – San Diego County Department of Environmental Health
- Curtis Brundage – San Bernardino County
- Veryl Wittig – Geosyntec Consultants
- Sam Williams – Geosyntec Consultants

Geosyntec has the available resources to implement the SAP in a timely manner. Sampling is scheduled to commence on 26 November and be completed by 30 November 2007. A draft report of sample results and findings will be submitted to interested parties by 18 December 2007.

STEP 2: Decision Statement

Based on an evaluation of the laboratory analytical data generated from the sampling to be performed as part of this assessment, it will be determined whether or not concentrations of COCs in the burn debris and ash exceed statutorily-established health-based criteria. In accordance with FEMA Disaster Assistance Policy 9523.13, CalEPA

and its boards, departments, and offices, have made the determination that the debris and ash resulting from the 2007 Southern California wildfires pose an immediate threat to public health and safety. If it is found through the analysis described herein that concentrations of COCs are in exceedance of statutorily-established health-based criteria (see Step 3), then those data will be used to support the determination already made by CalEPA.

STEP 3: Identify the Inputs to the Decision

To evaluate the decision statement, COC concentrations in burn debris will be compared to California statutorily-established health-based criteria. These criteria include the California Human Health Screening Levels (CHHSLs) and the EPA Regional IX Preliminary Remedial Goals (PRGs) for residential soil. However, OEHHA scientists in conjunction with CalEPA reserve the right to consider other accepted health based criteria in their decision making process including those listed below. The following is a list of identified inputs to the decision statement.

- EPA SW-846 Practical Quantification Levels (PQLs) or laboratory specific PQLs;
- EPA-approved analytical methods for Title 22 Metals and polycyclic aromatic hydrocarbons (PAHs);
- Burn debris sampling results from the SAP;
- Statistical analysis applied to data, as appropriate;
- California statutorily-established health-based criteria for each constituent of concern using the most conservative value from the following:
  - CHHSLs,
  - EPA Region IX PRGs for residential receptors,
  - EPA Region IX protection to groundwater values,
  - California Department of Public Health Maximum Contaminant Levels (MCLs) for drinking water,
  - OEHHA Public Health Goals (PHGs) for drinking water,
  - San Francisco RWQCB ESLs for protection of surface water, and
  - California hazardous waste criteria.

It should be noted that there are no specific health-based criteria for burn ash. Therefore, for purposes of the risk evaluation, criteria promulgated for soil are assumed to be relevant to the burn ash. The CHHSLs are concentrations of 54 hazardous chemical that CalEPA considers to be below thresholds of concern for risks to human health. CHHSL values have been developed for soil ingestion, dermal contact, and inhalation of vapors or dust in outdoor air. Under most circumstances, the presence of chemicals at concentrations below the corresponding CHHSLs can be assumed to not pose a

significant health risk to people who may work or live at the affected site. However, the presence of a chemical at concentrations in excess of the CHHLS may indicate a potential for adverse risk.[6] CHHSLs do not exist for every COC that may be found through this analysis. Therefore, other statutorily-established health-based standards may be used to evaluate the data. It is important to note that many health-based criteria are promulgated for soil. This approach may underestimate the risk associated with exposure to burn debris and ash. Exposure to the hazardous components in ash may be through hand-to-mouth contact and other sources of ingestion, such as food crop and drinking water contamination, as well as dermal irritation and uptake. In addition, because of its physical characteristics, such as density and particle size, ash presents an inhalation hazard, thereby increasing the number of potentially susceptible receptors that may be exposed.

STEP 4: Define the Boundaries of the Study

The domain of this investigation includes the areas burned by the October 2007 wildfires within the Counties of San Bernardino and San Diego. Burn debris samples will be collected from a typical suburban residential neighborhood with high density housing in one of the most devastated areas of one of the fires from each county. These areas will be selected by a designated and qualified representative from each county.

For each selected area, a statistical- and GIS-based method should be employed to determine the location and number of analyses so that random, non-biased samples can be collected. This approach will allow for determining the average COC concentration in the burn debris for a typical residential neighborhood.

STEP 5: Develop Decision Rules

The following is a list of decision rules to be applied to the Burn Debris Sampling and Analysis Plan and interpretation of the resulting data.

1. If the property selected for sampling has not been cleared of burn debris, the area of the structure will be divided into cells based on the size of the structure. Discrete samples will be randomly collected within each cell (Section 3.1) and homogenized to comprise on composite sample for the structure.
2. If the selected property has been cleared of all burn debris, an alternate randomly-selected property that has not been cleared will be sampled.
3. If the burn debris has been removed from the foundation of the structure and is stockpiled on the selected property, a composite

[6] CalEPA, 2005. Use of California Human Health Screening Levels in Evaluation of Contaminated Properties, California Environmental Protection Agency (CalEPA), January 2005.

sample of the stockpile will be collected (Section 3.1) and homogenized to comprise on composite sample for the structure.

4. If concrete, metal, glass, roofing tiles, ceramic, and stucco are present, it will not be sampled.
5. If concentrations of one or more COCs in the burn debris samples exceeds one or more California statutorily-established heath-based criteria, the burn debris will be considered to represent an immediate threat to public health and safety.

STEP 6: Specific Limits on Decision Errors

The lowest concentrations of COCs that can be detected in the burn debris are a function of the laboratory detection limits. The upper concentrations of concern are the California statutorily-approved health-based criteria. COC concentrations are important components in determining decisions errors. In order to understand the decision errors, the null hypothesis and alternate hypothesis are presented and defined below.

- Null Hypothesis = COC concentrations in burn debris exceed the risk-based soil quality goal.

- Alternate Hypothesis = COC concentrations in burn debris do not exceed the risk-based soil quality goal.

The two types of decision errors include the following:

1. False positive decision error: Determining that COC concentrations in burn debris do not exceed risk-based goals when in truth they actually exceed risk-based goals, thus, falsely rejecting the null hypothesis. Potential consequences of this decision error will be that human receptors will potentially be exposed to COCs in burn debris.

2. False negative decision error: Determining that the COC concentrations in burn debris exceed risk-based goals, when in truth they do not exceed risk-based goals, thus, falsely accepting the null hypothesis. Potential consequences of this decision error include implementing unnecessary corrective actions. In addition, unnecessary corrective actions would increase project costs with no significant increased benefit to human health and the environment.

The likely source of error would most likely be due to sampling or analysis procedures, which can bias the results to produce either a false-positive or a false-negative decision. Nonetheless, potential measurement errors can be controlled to improve the likelihood of

a correct decision. The probability of procedural errors will be controlled by consistent application of standard sampling and analysis procedures. In addition, data quality management will control potential errors.

The specific acceptable error limit (confidence interval) for the analysis specified in Decision Rule 5 will be 95%, based on the data population. Because actions prescribed by the remainder of the decision rules will be based on site conditions, the need to develop specific acceptable error limits is unwarranted. The analysis of data from all properties sampled in each county should converge on a representative average concentration of each COC and minimize the possibility of implementing an action because of a decision error.

STEP 7: Optimize the Design of the Data Collection Program

Burn debris sampling will be performed in accordance with this Sampling and Analysis Plan which follows standard EPA environmental sampling protocol. The statistical- and GIS-based method of determining which properties will be selected for sampling and how samples will be collected within each county and at each property will allow for the collection of random, non-biased samples.

This approach will consist of the following steps:

1. The number of structures destroyed within the selected area in each county will be identified.
2. Based on this number, the number of samples required to statistically characterize this population with a 95% confidence interval will be determined using a simple statistical algorithm.
3. Using GIS, polygons will be placed on the maps of the selected areas containing the burned structures and the burned properties will be identified.
4. Using these constraints and the number of samples required for a 95% confidence interval, the GIS software will be used to randomly select the specific properties that will be sampled within each county.
5. When the sampling crew arrives at the property selected for sampling, they will assess the nature and volume of the burn debris. If the burn debris has been cleared, an alternate randomly-selected property that has not been cleared will be sampled.
6. The structure selected for sampling will be divided into cells based on the estimate volume of ash and debris associated with the former structure and random locations within each cell will selected for sampling using a random number generator. Discrete samples from each cell will be combined in to one composite sample for each fire-

destroyed structure on the property. These methods are described in detail in Section 3.1 of the Sampling and Analysis Plan.

7. The resulting data will be tabulated and the arithmetic mean and geometric mean concentration for each COC will be calculated. The individual composite sample concentrations, arithmetic mean concentrations, and geometric mean concentrations will be compared to California statutorily-establish health-based criteria and other accepted health based criteria as indicated in "Step 3 - Identify the Inputs to the Decision." If the concentration of one or more COCs is found to exceed these accepted health-based criteria, then these data will be used in support of the determination that fire ash and debris from the 2007 Southern California wildfires pose a threat to public health and safety, as already determined by CalEPA and its boards, departments, and offices, in conjunction with guidelines established in the FEMA Disaster Assistance Policy 9523.13.

Geosyntec consultants

ATTACHMENT 2
EXAMPLE FIELD SAMPLING FORM

Geosyntec consultants

Post Fire Burn Areas
Sampling Form

Sampling Personnel: _____ Date/Time: _____
Property Address: _____ Property APN: _____
Property GPS Coordinates: _____ Approximate Footprint Dimensions: _____
Approximate Debris Volume: _____ Composite Sample ID: _____
Juristiction: _____ Chain of Custody No. _____
Structure No: ____ of ____

Cell ID	Point Sample ID	Random "x"	"x" Distance	Random "y"	"y" Distance	Photo ID	Brief Sample Description
		0.47		0.48			
		0.97		0.42			
		0.61		0.04			
		0.53		0.96			
		0.34		0.49			
		0.84		0.27			

Site Sketch (Include at least coordinate origins, cell divisions, garage location, and point sample locations)

Other Observations: _____

ATTACHMENT 3
LABORATORY METHOD DETECTION LIMITS AND REPORTING LIMITS

COMPOUND LISTING / MDL / CALC REPORTING LIMIT FOR TESTCODE

6010B S TTLC (1474)

METHOD: EPA 6010B **MATRIX:** S

COMPOUND NAME	MDL	RL	UNITS
Aluminum	0.2157256	2.50000	mg/kg
Antimony	0.1906209	0.75000	mg/kg
Arsenic	0.1303323	0.75000	mg/kg
Barium	0.1639326	0.50000	mg/kg
Beryllium	0.0036826	0.25000	mg/kg
Bismuth	0.1900000	5.00000	mg/kg
Boron	0.1286296	1.00000	mg/kg
Cadmium	0.0098783	0.50000	mg/kg
Calcium	0.7656523	5.00000	mg/kg
Chromium	0.0291265	0.25000	mg/kg
Cobalt	0.0085891	0.25000	mg/kg
Copper	0.0468778	0.50000	mg/kg
Iron	0.2913465	5.00000	mg/kg
Lead	0.0527146	0.50000	mg/kg
Lithium	0.2157256	2.50000	mg/kg
Magnesium	0.2069185	5.00000	mg/kg
Manganese	0.0611364	0.25000	mg/kg
Molybdenum	0.0205976	0.25000	mg/kg
Nickel	0.0346490	0.25000	mg/kg
Phosphorus, Total	0.2929081	5.00000	mg/kg
Potassium	1.9817720	25.00000	mg/kg
Selenium	0.1751919	0.75000	mg/kg
Silicon	0.2948994	5.00000	mg/kg
Silver	0.0209340	0.25000	mg/kg
Sodium	2.2423820	25.00000	mg/kg
Strontium	0.0109862	1.50000	mg/kg
Sulfur, Total	1.2557000	5.00000	mg/kg
Thallium	0.0987097	0.75000	mg/kg
Tin	0.4504804	2.50000	mg/kg
Titanium	0.1125009	1.50000	mg/kg
Vanadium	0.0093357	0.25000	mg/kg
Zinc	0.1770479	1.00000	mg/kg

MATRIX - W = Water/Aqueous. S = Soil/Solid. A = Air. T = Tissue.

COMPOUND LISTING / MDL / CALC REPORTING LIMIT FOR TESTCODE

PAH-S-SIM (4740)

METHOD: EPA 8270C SIM PAHs **MATRIX:** S

COMPOUND NAME	MDL	RL	UNITS
1-Methylnaphthalene	0.0043	0.0200	mg/kg
2-Methylnaphthalene	0.0024	0.0200	mg/kg
Acenaphthene	0.0050	0.0200	mg/kg
Acenaphthylene	0.0024	0.0200	mg/kg
Anthracene	0.0062	0.0200	mg/kg
Benzo (a) Anthracene	0.0026	0.0200	mg/kg
Benzo (a) Pyrene	0.0020	0.0200	mg/kg
Benzo (b) Fluoranthene	0.0014	0.0200	mg/kg
Benzo (g,h,i) Perylene	0.0033	0.0200	mg/kg
Benzo (k) Fluoranthene	0.0045	0.0200	mg/kg
Chrysene	0.0047	0.0200	mg/kg
Dibenz (a,h) Anthracene	0.0027	0.0200	mg/kg
Fluoranthene	0.0019	0.0200	mg/kg
Fluorene	0.0031	0.0200	mg/kg
Indeno (1,2,3-c,d) Pyrene	0.0035	0.0200	mg/kg
Naphthalene	0.0037	0.0200	mg/kg
Phenanthrene	0.0038	0.0200	mg/kg
Pyrene	0.0033	0.0200	mg/kg
Total PAHs	0.0062	0.0200	mg/kg

MATRIX - W = Water/Aqueous. S = Soil/Solid. A = Air. T = Tissue.